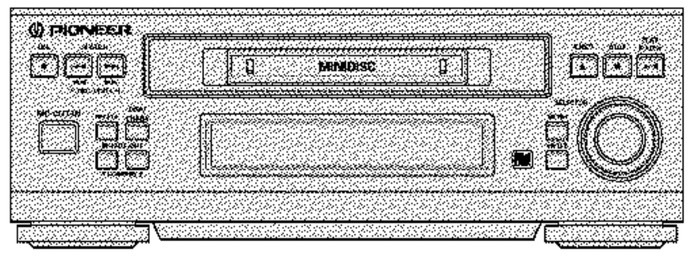
Service Manual

PIONEER®
The Art of Entertainment



ORDER NO.
RRV1934

MINI DISC RECORDER
MJ-R5

THIS MANUAL IS APPLICABLE TO THE FOLLOWING MODEL(S) AND TYPE(S).

Type	Model	Power Requirement	Remarks
	MJ-R5		
ZY	O	DC power supplied from other system component	

- **These products are component of systems.**
- **This product does not operate normally by itself. Please connect it to the STEREO TUNER AMPLIFIER SX-R9/MY, for adjustment and operation inspection. Otherwise damage may result.**

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1. SAFETY INFORMATION

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING
Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5).
When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

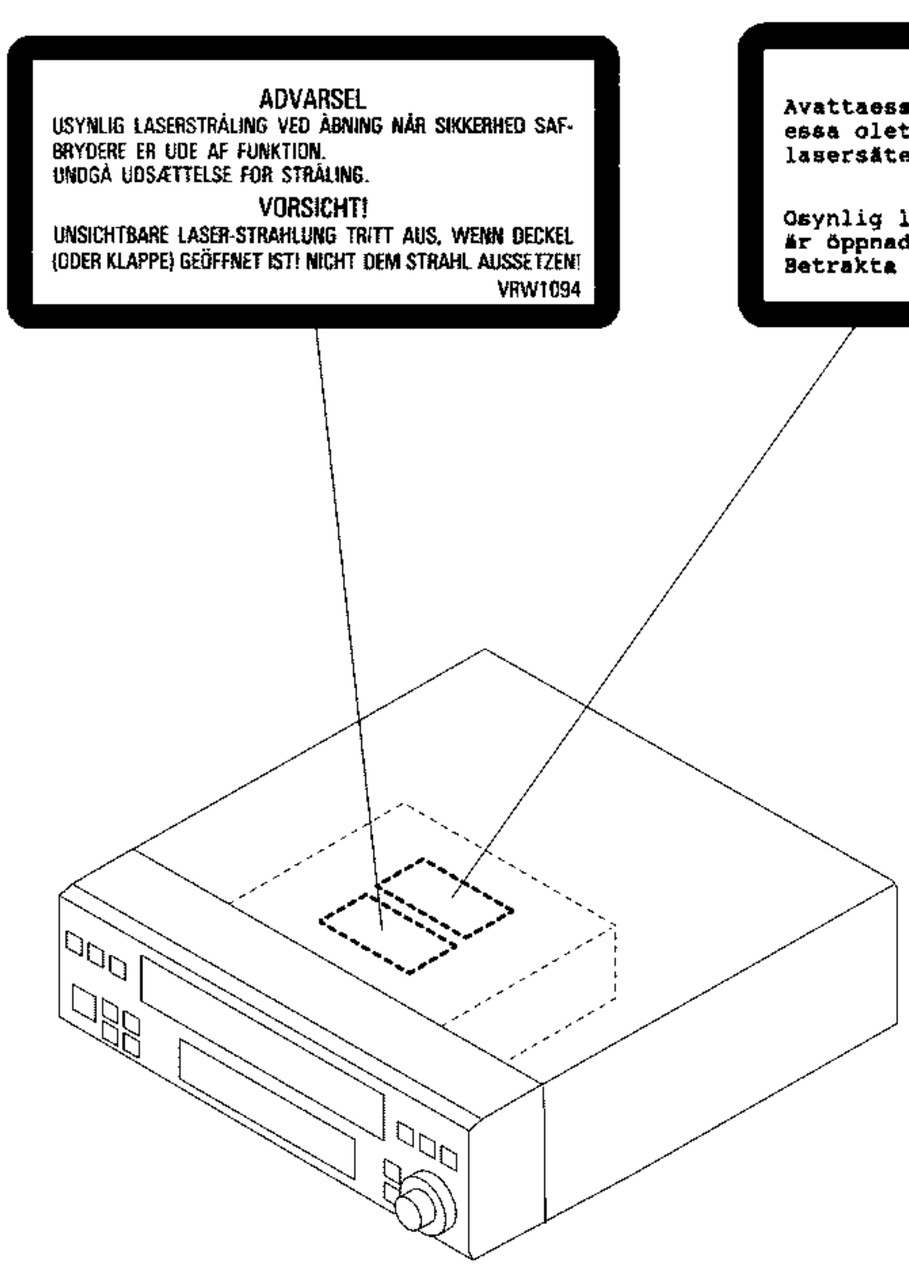
IMPORTANT

THIS PIONEER APPARATUS CONTAINS LASER OF CLASS 1.
SERVICING OPERATION OF THE APPARATUS SHOULD BE DONE BY A SPECIALLY INSTRUTED PERSON.

LASER DIODE CHARACTERISTICS

MAXIMUM OUTPUT POWER: 7 mw
WAVELENGTH: 780 – 785 nm

LABEL CHECK


ADVARSEL
USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHED SAFBRYDERE ER UDE AF FUNKTION.
UNDGÅ UDSÆTTELSE FOR STRÅLING.
VORSICHT!
UNSICHTBARE LASER-STRAHLUNG TRITT AUS, WENN DECKEL (ODER KLAPPE) GEÖFFNET IST! NICHT DEM STRAHL AUSSETZEN!
VRW1094
VARO!
Avattaessa ja suojalukitus ohitettaessa olet alttiina näkymättömälle lasersäteilylle. Älä katso säteeseen.
VARNING!
Osynlig laserstrålning när denna del är öppnad och spärren är urkopplad. Betrakta ej strålen.
PRW1233

Additional Laser Caution

1. Laser Interlock Mechanism
   The position of the switch (SW1956) for detecting loading state is detected by the MD mechanism microprocessor (IC1401), and the design prevents laser diode oscillation when the switch (SW1956) is OFF (Pin 6 of IC1401 is high level.). Thus, the interlock will no longer function if the switch (SW1956) is deliberately set to ON. (Pin 6 of IC1401 is low level.)
   The interlock also does not function in the test mode*.
   Laser diode oscillation will continue, if pin 20 of IR3R50 (IC1101) is connected to GND, or else the terminals (between emitter and collector) of Q1101 are shorted to each other.

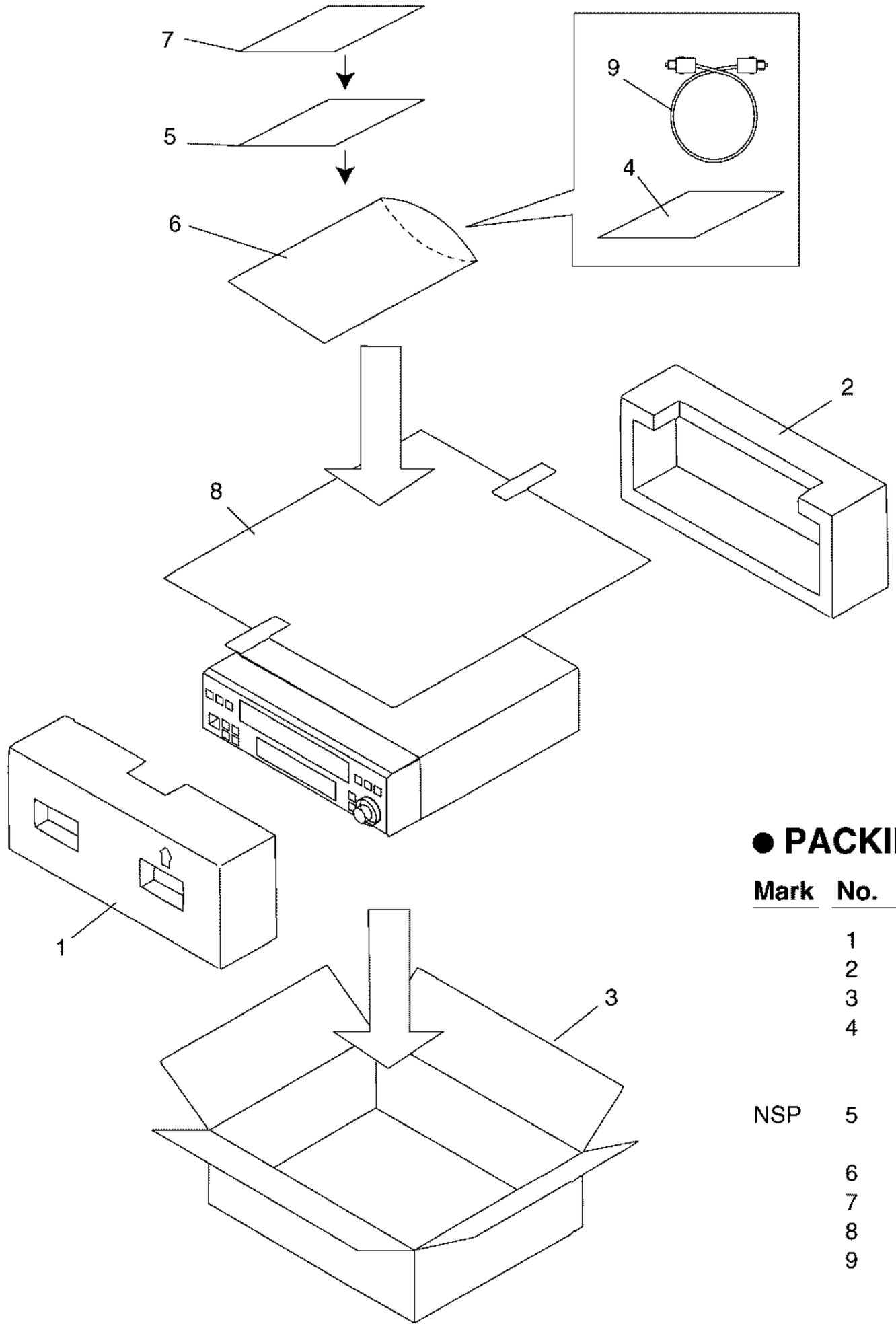
2. When the cover is opened with the shielding case of MD mechanism assy (AYM7003) is further opened, close viewing of the objective lens with the naked eye will cause exposure to a Class 1 laser beam.

* Refer to page 28.

2. EXPLODED VIEWS AND PARTS LIST

NOTES : ÷ *Parts marked by* " NSP " *are generally unavailable because they are not in our Master Spare Parts List.*
÷ *The* ⚠ *mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
÷ *Screw adjacent to* ∞ *mark on the product are used for disassembly.*

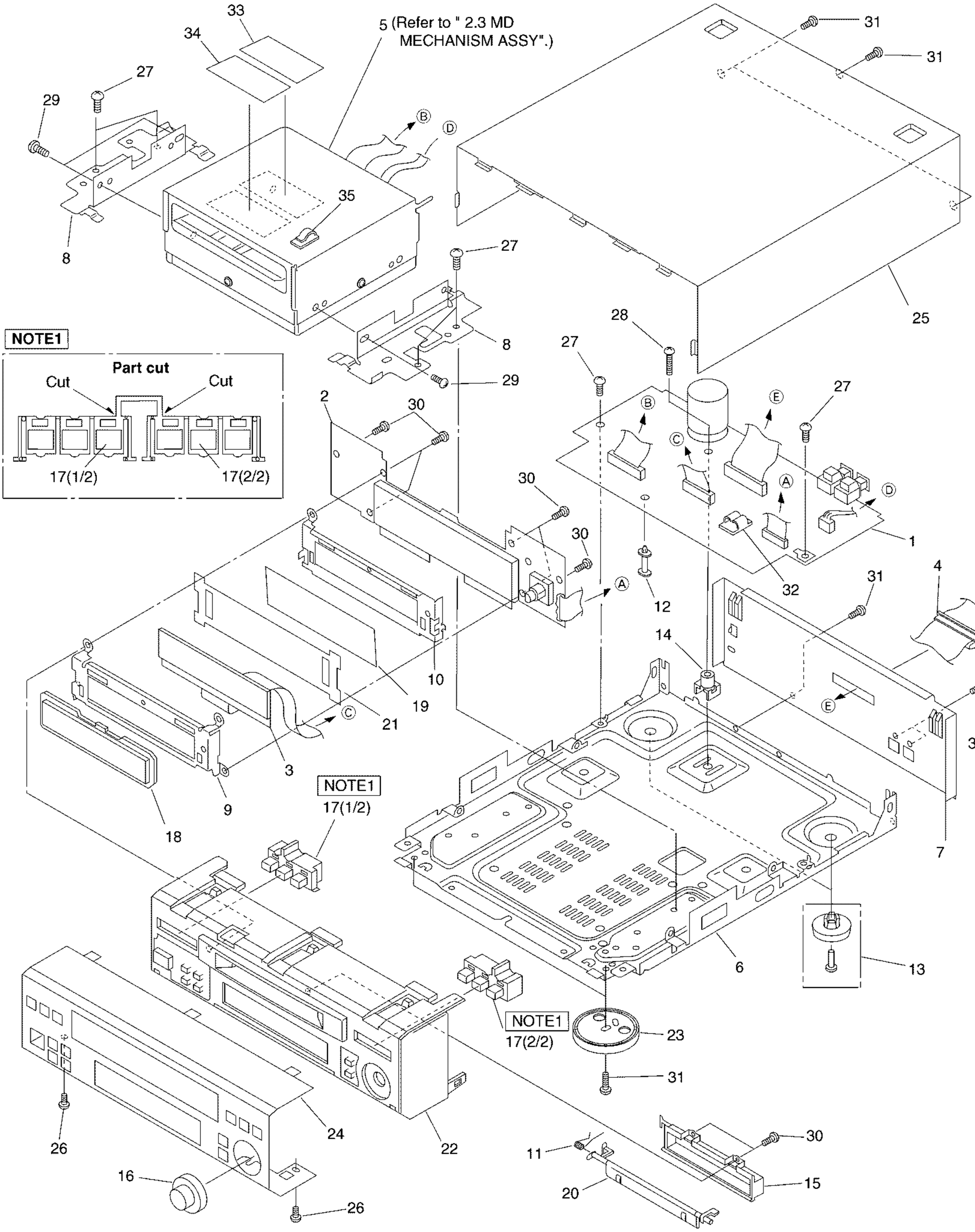
2.1 PACKING



● PACKING PARTS LIST

Mark	No.	Description	Part No.
	1	Pad Front	AHA7199
	2	Pad Rear	AHA7200
	3	Packing Case	AHD7611
	4	Operating Instructions (English/French/German/Italian/ Dutch/Spanish)	ARE7178
NSP	5	Warranty Card	ARY7008
	6	Polyethylen Bag (0.03×230×340)	Z21–038
	7	CAUTION Sheet	ARM7034
	8	Packing Sheet(0.5X400X550)	AHG7051
	9	Optical Fiber Cable	ADE7021

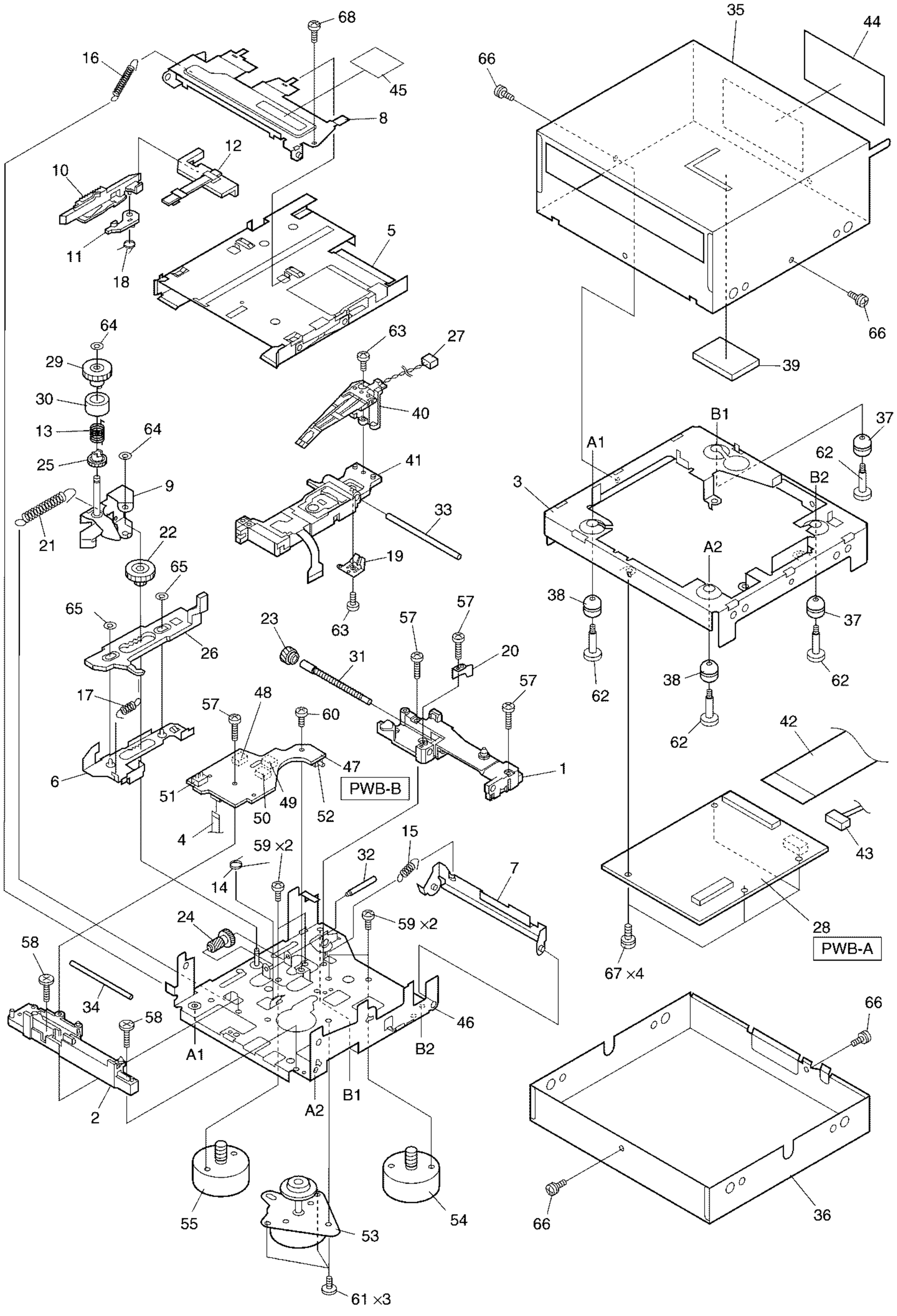
2.2 EXTERIOR


33
34
27
29
8
35
5 (Refer to " 2.3 MD MECHANISM ASSY".)
B
D
31
31
25
27
8
29
NOTE1
Part cut
Cut
Cut
17(1/2)
17(2/2)
2
30
30
30
28
27
27
B
C
E
A
D
1
32
12
4
31
14
E
31
7
10
19
21
C
3
9
18
NOTE1
17(1/2)
6
13
NOTE1
17(2/2)
23
31
24
22
26
16
26
11
20
30
15

● EXTERIOR SECTION PARTS LIST

Mark	No.	Description	Part No.
	1	MAIN ASSY	AWU7152
	2	FRONT ASSY	AWZ8887
	3	LCD Display	AAV7050
	4	Cord With Plug	ADE7018
	5	MD MECHANISM ASSY	AXA7054
NSP	6	Chassis MD	ANA7063
	7	Rear Panel MD	ANC7684
	8	Mecha Stay MD	ANG7155
	9	Window Holder	ANG7156
	10	LCD Holder MD	ANG7157
	11	MD Flap Spring	ABH7160
NSP	12	PCB Spacer	AEC1372
	13	Elastic Foot	AEC7114
NSP	14	PCB Mold	AMR2115
	15	MD Flap Holder	AMR7186
	16	Jog Knob MD	AAB7137
	17	Play Button	AAD7411
	18	Display Window	AAK7464
	19	Display Filter	AAK7467
	20	MD Flap	AAK7468
	21	Spread Sheet	AAK7524
	22	Panel Base	AMB7460
	23	Insulator Assy	AMR7189
	24	AL Panel	ANB7104
	25	Bonnet	AZN7701
	26	Screw	BBT30P080FZK
	27	Screw	BBZ30P060FCC
	28	Screw	BBZ30P140FMC
	29	Screw	PMA30P080FMC
	30	Screw	PPZ30P080FMC
	31	Screw	VBZ30P080FZK
	32	Mini Clamp	DEC1795
	33	Caution Label	RRW1233
	34	Caution Label	VRW1094
NSP	35	Flat Cable Clip	DEC1279

2.3 MD MECHANISM ASSY



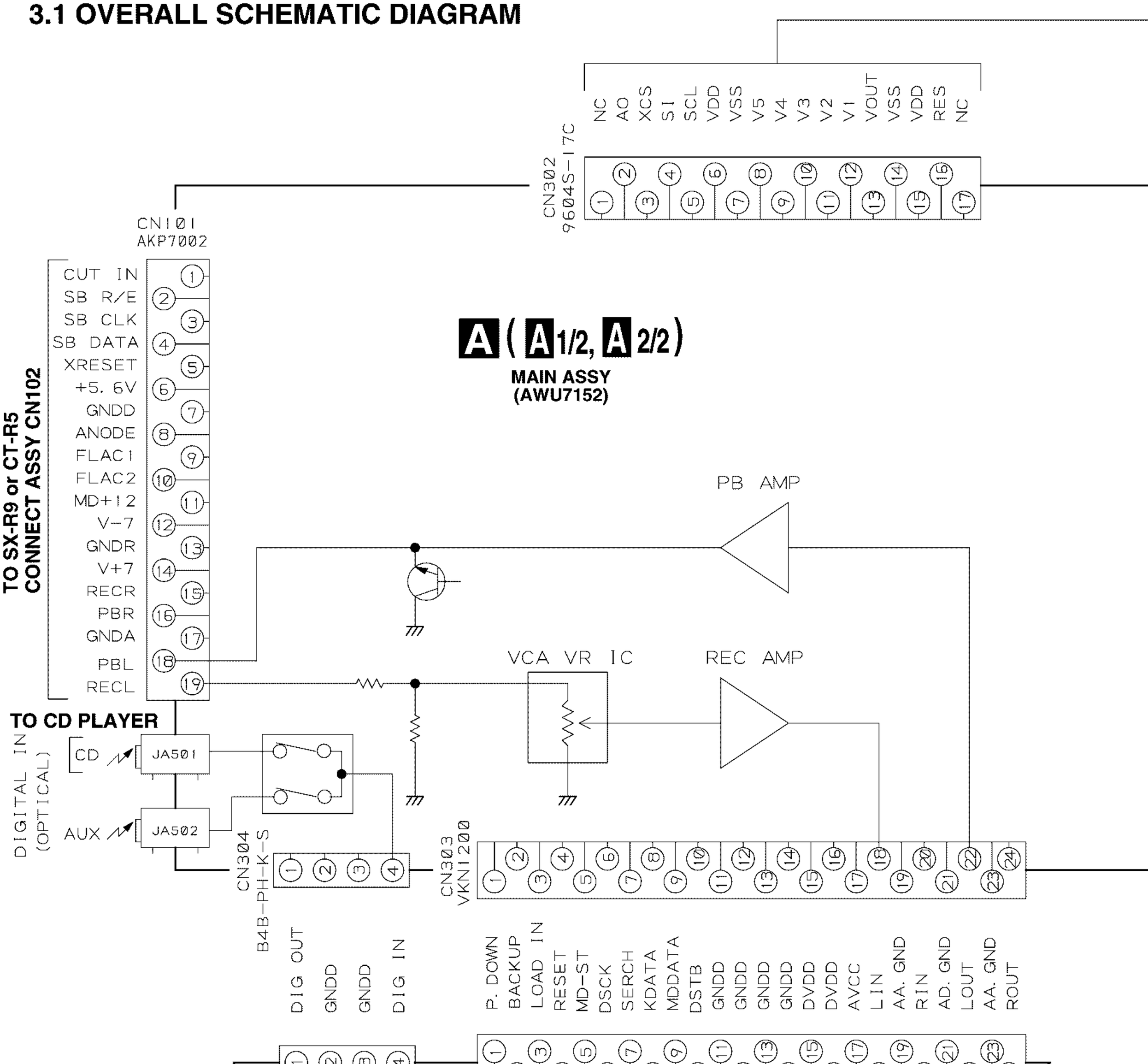
● MD MECHANISM ASSY PARTS LIST

Mark	No.	Description	Part No.	Mark	No.	Description	Part No.
	1	Loading Gear Shaft	1242900108		36	Bottom Cover	1243230028
	2	MD Guide (B)	1242000209		37	Cushion (A)	1243260020
	3	Base Frame	1242000210		38	Cushion (B)	1243260021
	4	Flat Cable 5P (CW1901)	1245120287		39	Cushion	1243260097
	5	Cartridge Holder	1242140138		40	Magnet Head	1246100008
	6	Cam Plate Lever	1242480122		41	Pickup	1246170019
	7	H/A Shift Arm	1242480123		42	MD Flexible Cable (24P)	1245120301
	8	Holder Arm	1242480124		43	Connector Assy	1245120299
	9	Roller Arm Lever	1242480125		44	Wire Guard Sheet	1244030168
	10	Clamper Lever	1242480126		45	Head Guard Sheet	1244030163
	11	Catch	1242480127		46	Drive Chassis	1242070047
	12	Slider Lever	1242480128		47	PWB-B	1245210149
	13	Roller Holder Spring	1242580157			(MD Mechanism Switch Assy)	
	14	Spring	1242580159		48	Push Switch (SW1956)	1245300025
	15	Shift Arm Spring	1242580053		49	Push Switch (SW1954)	1245300026
	16	Holder Arm Spring	1242580054		50	Push Switch (SW1955)	1245300026
	17	Rack Spring	1242580055		51	Push Switch (SW1952)	1245300027
	18	Catch Spring	1242580094		52	Slide Switch (SW1953)	1305301315
	19	Spring (A)	1242580160		53	Spindle Motor (M901)	1246300048
	20	Drive Shaft Spring	1242580161		54	Sled Motor (M902)	1246300049
	21	Roller Arm Spring	1242580093		55	Loading Motor (M903)	1246300050
	22	Loading Gear (B)	1242810063		56	.....	
	23	Drive Gear	1242810064		57	Screw	1249700161
	24	Loading Gear (A)	1242810065		58	Screw	1249700162
	25	Roller Gear	1242810066		59	Screw	1249700163
	26	Rack Gear	1242810067		60	Screw	1249700061
	27	Connector 2P (CN1903)	1245120288		61	Screw	1249700065
	28	PWB-A (MD Main Assy)	1246840167		62	Screw	1249700076
	29	Roller Holder	1242860001		63	Screw	1249700108
	30	Transfer Roller	1242870014		64	Washer	1249900005
	31	Drive Shaft	1242900105		65	Washer	1249900006
	32	Pickup Guide Shaft	1242900040		66	Screw	1189700020
	33	MD Guide (A)	1242000208		67	Screw	1249700077
	34	Pickup Slide Shaft	1242900039		68	Screw	1249700011
	35	Top Cover	1243230027				

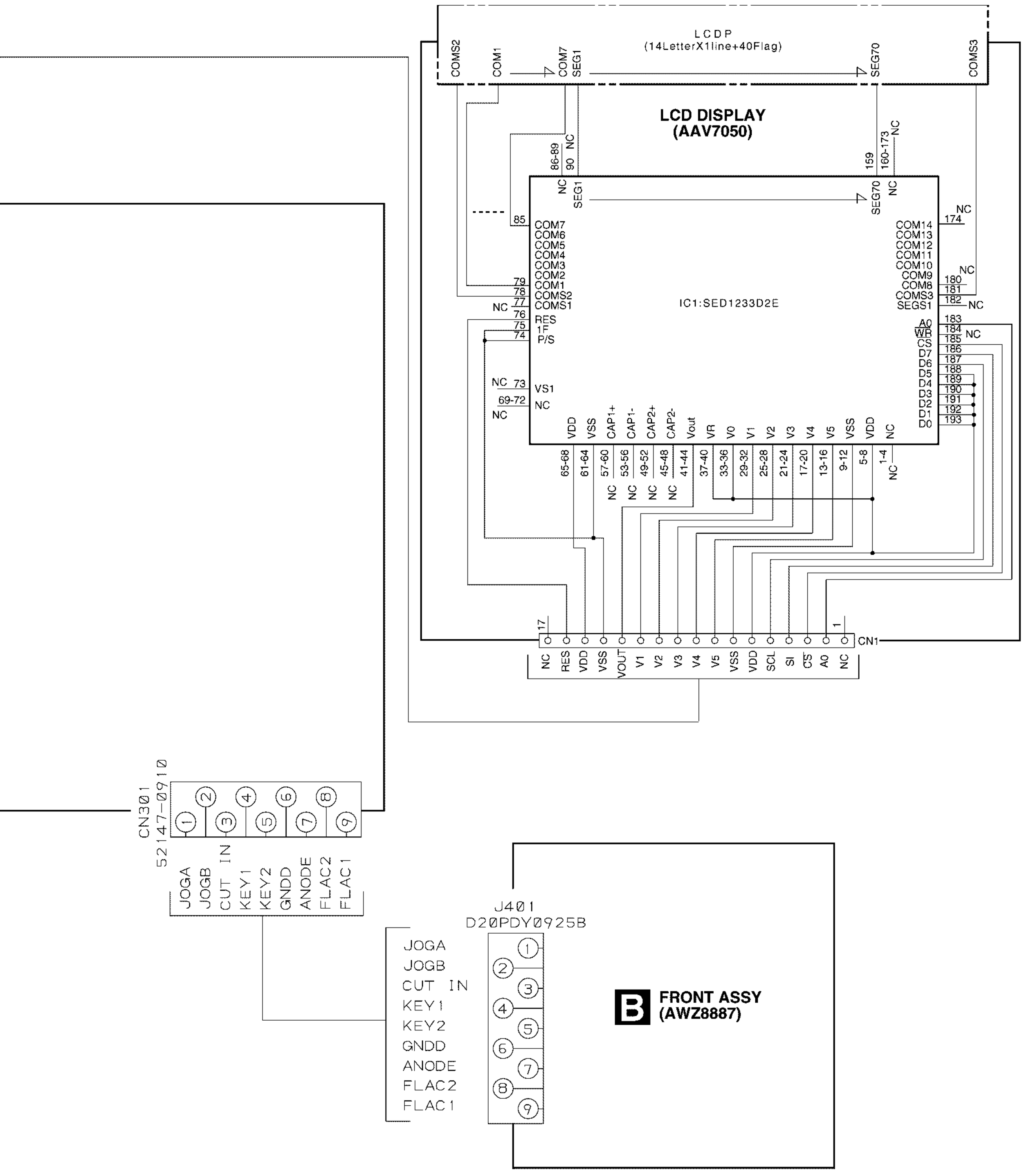
3. SCHEMATIC DIAGRAM

Note: When ordering service parts, be sure to refer to "EXPLODED VIEWS AND PARTS LIST" or "PCB PARTS LIST".

3.1 OVERALL SCHEMATIC DIAGRAM



MJ-R5


LCDP
(14LetterX1line+40Flag)
COMS2
COM1
COM7
SEG1
SEG70
COMS3
LCD DISPLAY
(AAV7050)
86-89
90
NC
159
160-173
NC
NC
SEG1
SEG70
NC
85
COM7
COM6
COM5
COM4
COM3
COM2
COM1
COMS2
COMS1
79
78
77
76
75
74
NC
RES
1F
P/S
NC 73
VS1
69-72
NC
NC
IC1:SED1233D2E
COM14
COM13
COM12
COM11
COM10
COM9
COM8
COMS3
SEGS1
NC
174
180
181
182
183
184
185
186
187
188
189
190
191
192
193
A0
WR
CS
D7
D6
D5
D4
D3
D2
D1
D0
VDD VSS CAP1+ CAP1- CAP2+ CAP2- Vout VR V0 V1 V2 V3 V4 V5 VSS VDD NC
65-68 61-64 57-60 53-56 49-52 45-48 41-44 37-40 33-36 29-32 25-28 21-24 17-20 13-16 9-12 5-8 1-4
NC NC NC NC NC
17
1
CN1
NC RES VDD VSS VOUT V1 V2 V3 V4 V5 VSS VDD SCL SI CS A0 NC
CN301
52147-0910
1 2 3 4 5 6 7 8 9
JOGA
JOGB
CUT IN
KEY1
KEY2
GNDD
ANODE
FLAC2
FLAC1
J401
D20PDY0925B
JOGA
JOGB
CUT IN
KEY1
KEY2
GNDD
ANODE
FLAC2
FLAC1
1 2 3 4 5 6 7 8 9
B
FRONT ASSY
(AWZ8887)

3.2 MAIN ASSY (1/2)

A 2/2

SCLK SDAT SR/E XRST DSTB LOAD SERCH MDST MDRST KDAT MDDAT DSCK MUTE CUTIN RECVOL ANODE PDWN X6. 5/5

A 2/2 FLAC1 FLAC2

A 1/2 MAIN ASSY (AWU7152)

TO SX-R9 or CT-R5 CONNECT ASSY CN102

CN101 AKP7002

CUT IN ① SB R/E ② SB CLK ③ SB DATA ④ XRESET ⑤ +5. 6V ⑥ GNDD ⑦ ANODE ⑧ FLAC1 ⑨ FLAC2 ⑩ MD+12 ⑪ V−7 ⑫ GNDR ⑬ V+7 ⑭ RECR ⑮ PBR ⑯ GNDA ⑰ PBL ⑱ RECL ⑲

CUTIN SR/E SCLK SDAT XRST ANODE X6. 5/5

R336 220 R335 220

C313 100p C314 100p C315 100p

C120 0.01 YB

IC102 AEK7013 2A

VD5. 6 VD+5

D103 S5688G

C116 100/10

GNDR GNDD GNDA GNDD

D110 S5688G D101 S5688G D105 S5688G

R119 8. 2 (2W) R118 180 (1W) D109 S5688G

R121 2. 2k C101 22000/16 ACH7078

C119 47/16 C106 0. 01 R103 1k

IC101 NJM2904M

C105 10/50 D108 MTZJ5. 1A R104 10k R105 10k R106 10k

Q103 DTC124EK

R111 1k C104 10/50

IC101 NJM2904M R114 100

VA+10 9.5V

Q101 2SC2458 R101 220

C102 47/16 D102 MTZJ10

Q102 2SD1859X MD_VA 6.0V

R102 470 C103 47/16 D104 MTZJ6. 8B

MD_VD

Q105 2SD2395 Heat Sink ANH1150

R120 12(2W)

D106 S5688G D107 S5688G

Q104 2SC2412K R115 22 R116 10k R117 10k C111 470/10

5.0V(Normal)
6.5V
(Loaging in Eject in)

RECVOL

CD Full scale in -7dBV (447 mVrms)Input

CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE. REPLACE WITH SAME TYPE NO. AEK7013, MFD BY LITTEL FUSE INK. FOR IC102.

C114 0. 1 C113 0. 1

KN101 VNF1084 CHASSIS

VOP+ +7.0V R107 47 (1/4W) C108 100/10

VOP− -7.0V R108 47 (1/4W) C109 100/10

VD+5 V−7

TO CD PLAY

OPT. IN CD JA501 GP1F32R

L501 10 C502 0. 01 C501 47/16 R501 22

OPT. IN AUX JA502 GP1F32R

L502 10 C504 0. 01 C503 47/16 R502 22

GNDD

IC501 TC74HC00AF

VD+5 +5.0V

A 2/2 AUXDIG CDDIG

C345 0. 01 C344 0. 01 C505 0. 01

R503 0

C CN1904

CN304 B4B-PH-K-S

DIG OUT ① DGND ② DGND ③ DIG IN ④

GNDD

D310 D305 D304 D303 1SS254

R353 47 C331 0. 047F ACH1246

C CN1902

P. DOWN ① BACKUP ② LOAD IN ③ RESET ④ MD-ST ⑤ DSCK ⑥ SERCH ⑦ KDATA ⑧ MDDATA ⑨ DSTB ⑩ DGND ⑪ DGND ⑫ DGND ⑬ DGND ⑭ DVDD ⑮ DVDD ⑯ AVCC ⑰ LIN ⑱ AA. GND ⑲ RIN ⑳ AD. GND ㉑ LOUT ㉒ AA. GND ㉓ ROUT ㉔

PDWN MDRST MDST DSCK SERCH KDAT

R362 47K

C342 0.1 C110 0. 01

MD_VD MD_VA W912

CN303 VKN1200 GNDR C117 0. 01

IC302 TC74HCT08AF

VCC GND LOAD DSTB MDDAT

C316 47/16 C317 0. 01

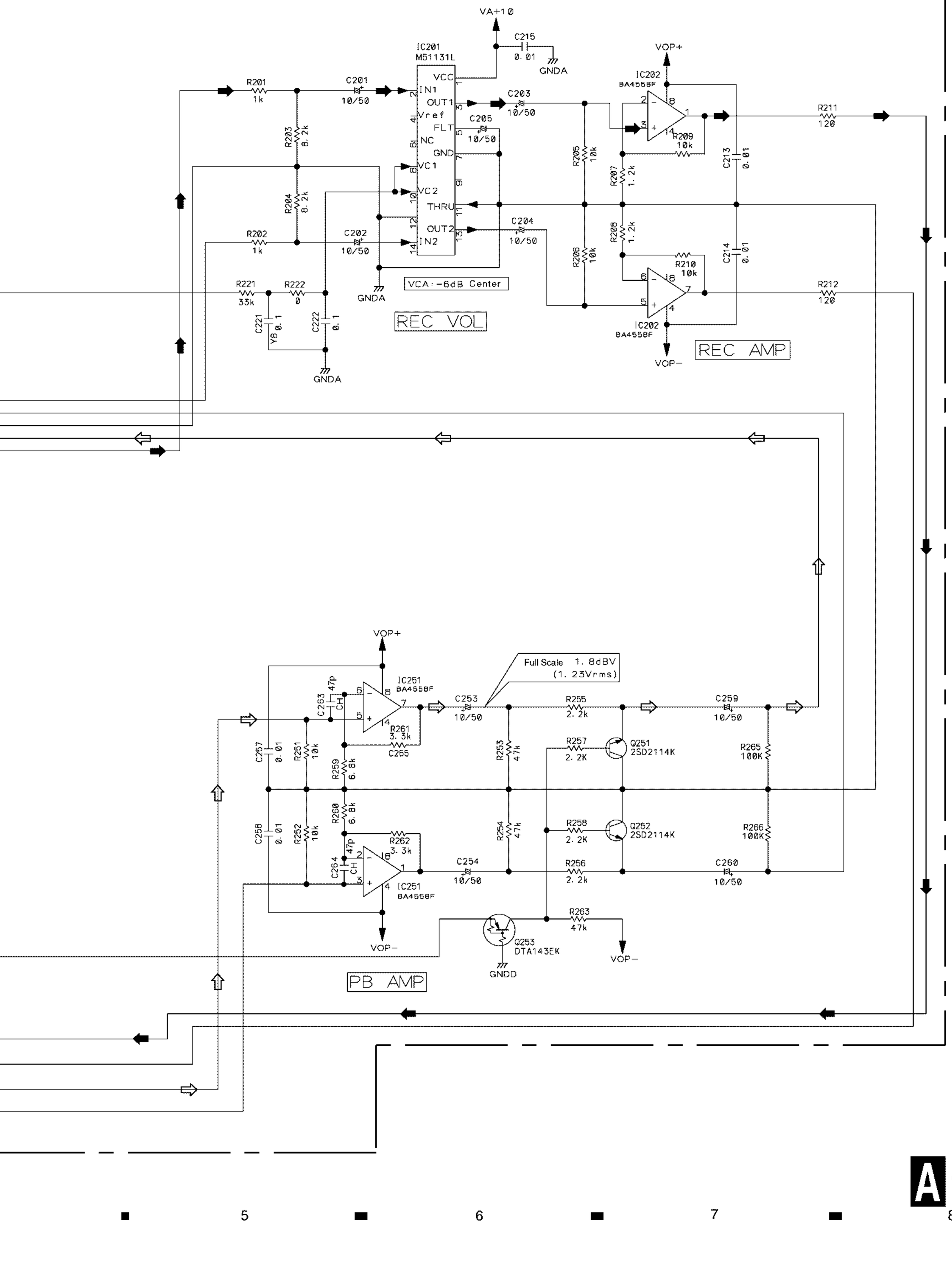
0. 857Vrms (Full scale)

0dB= 1. 8Vrms

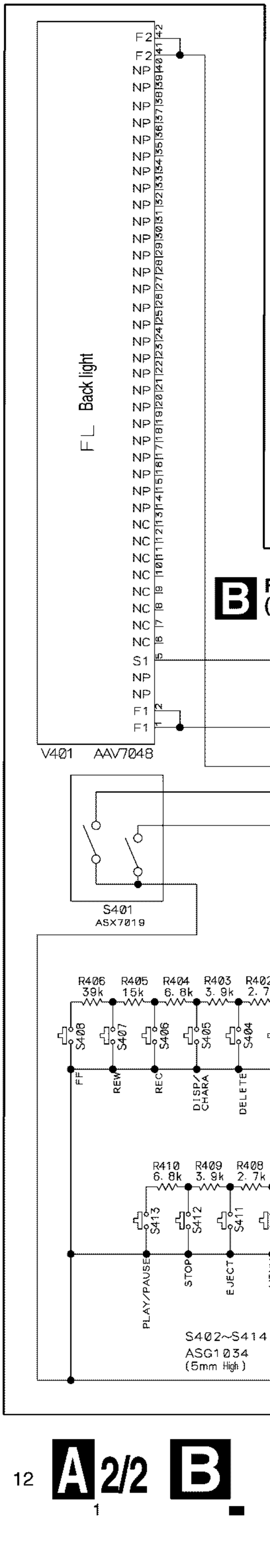
MUTE

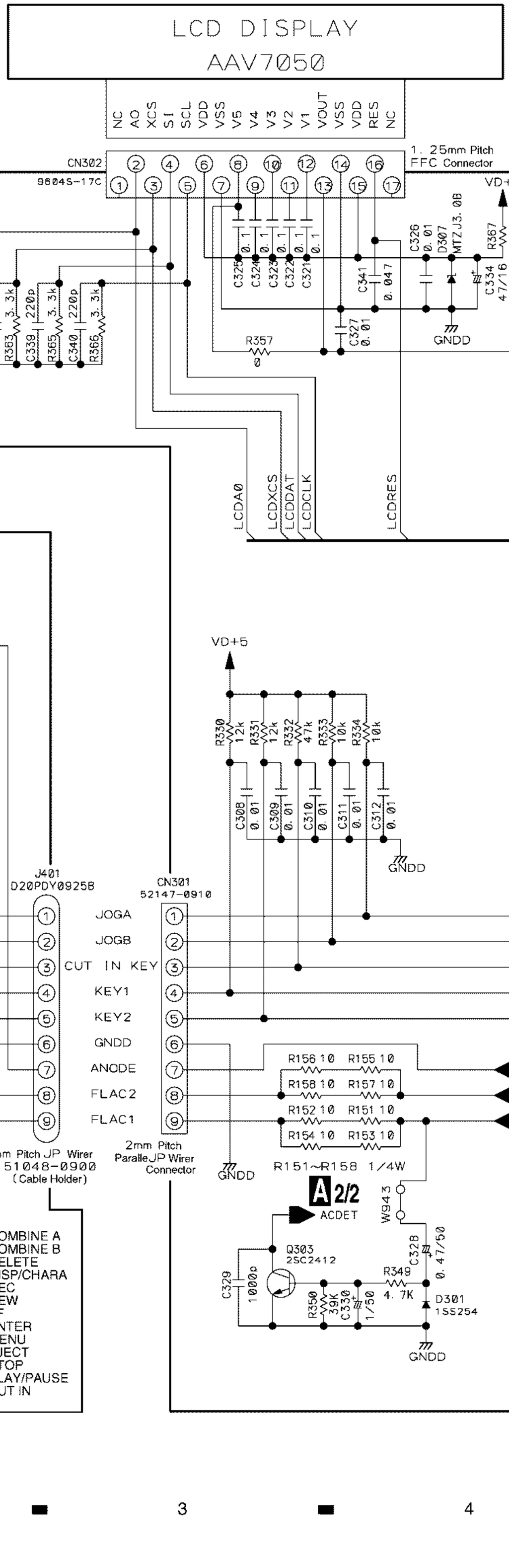
10 A 1/2

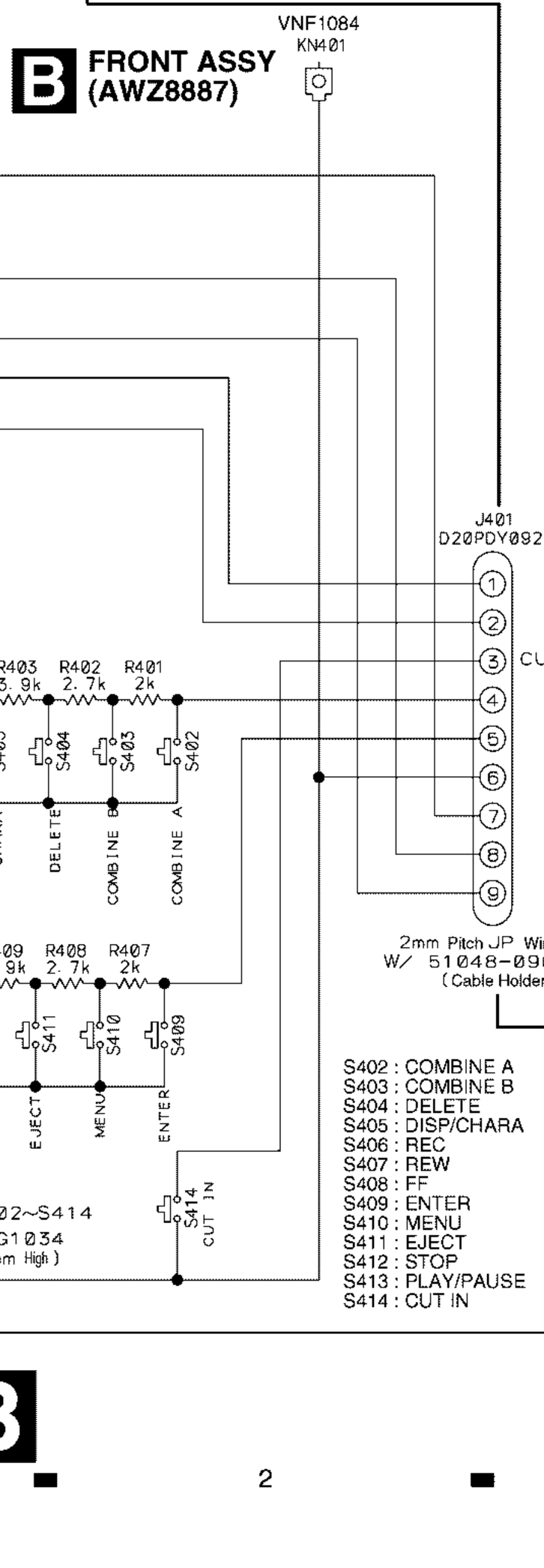
SIGNAL ROUTE
➡: REC SIGNAL SX-R9→MD MECHA
⇨: PB SIGNAL MD MECHA→SX-R9



3.3 MAIN ASSY (2/2) AND FRONT ASSY



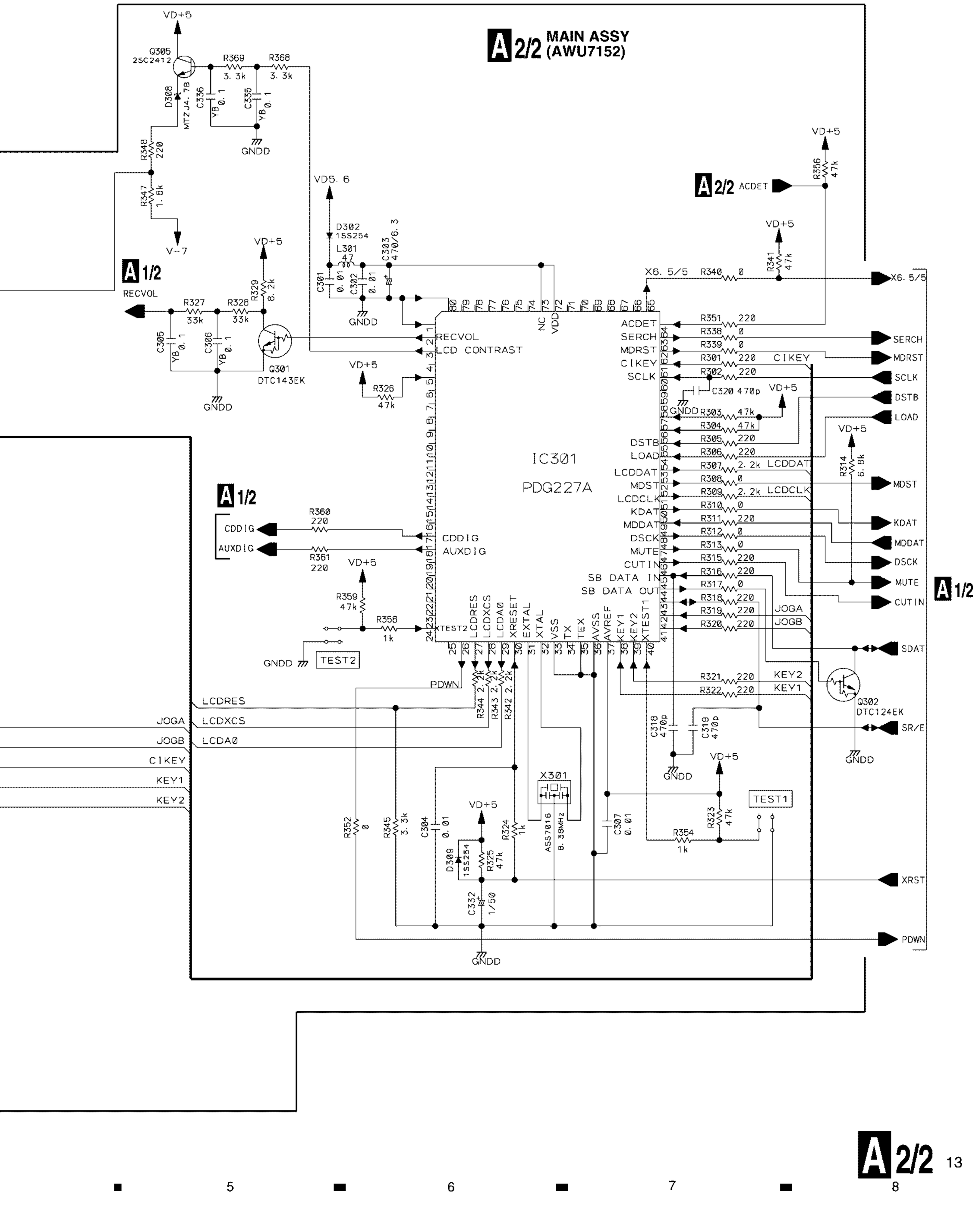




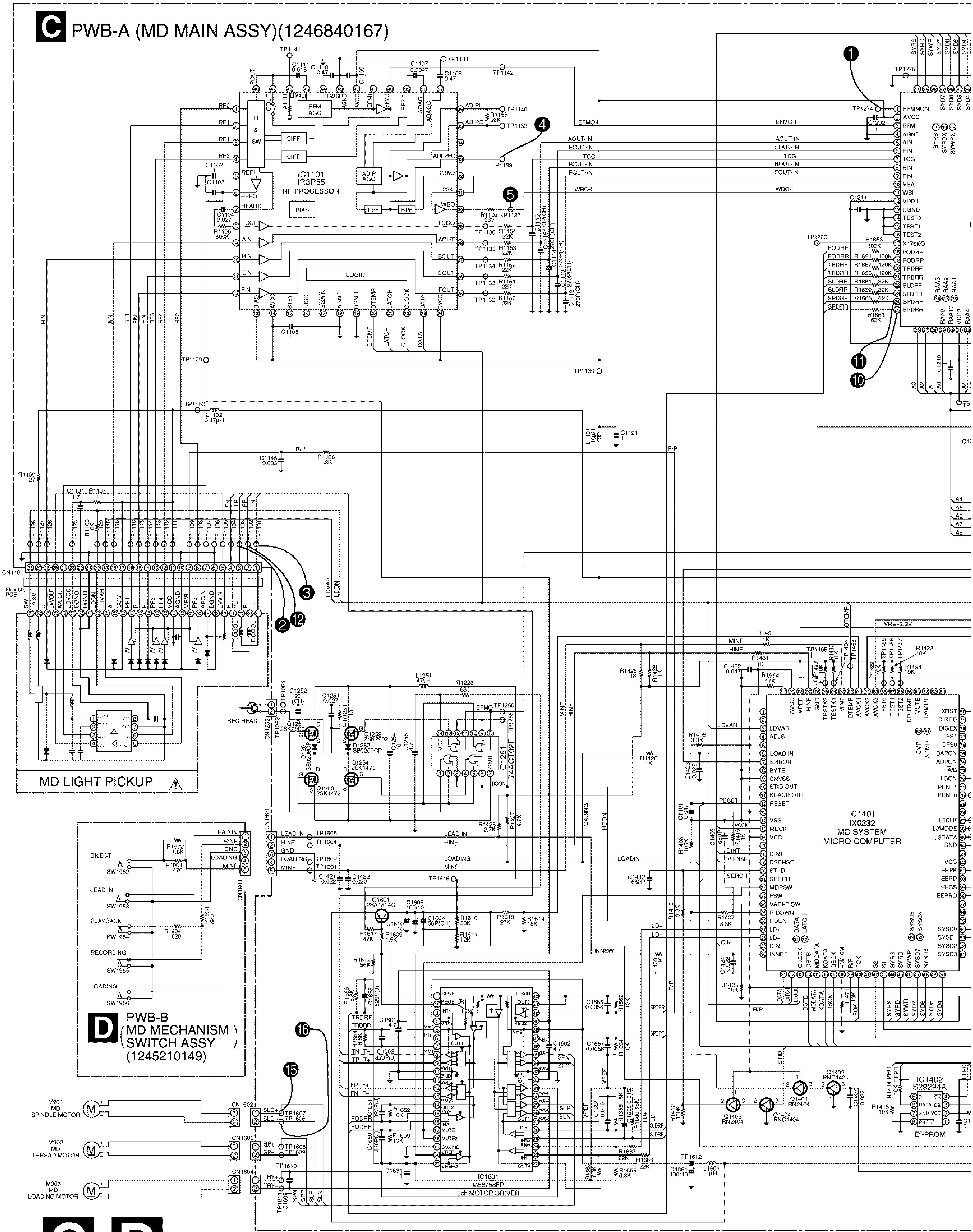
S402 : COMBINE A
S403 : COMBINE B
S404 : DELETE
S405 : DISP/CHARA
S406 : REC
S407 : REW
S408 : FF
S409 : ENTER
S410 : MENU
S411 : EJECT
S412 : STOP
S413 : PLAY/PAUSE
S414 : CUT IN

12 A 2/2 B

A 2/2 MAIN ASSY (AWU7152)



3.4 PWD–A (MD MAIN ASSY) AND PWB–B (MD MECHANISM SWITCH ASSY)


C PWB-A (MD MAIN ASSY)(1246840167)
IC1101
IR3R55
RF PROCESSOR
IC1251
74ACT02F
IC1401
IX0232
MD SYSTEM
MICRO-COMPUTER
IC1601
M56758FP
5ch MOTOR DRIVER
IC1402
S29294A
E²-PROM
MD LIGHT PICKUP
REC HEAD
CN1101
CN1601
CN1602
CN1603
CN1604
D PWB-B (MD MECHANISM SWITCH ASSY) (1245210149)
DILECT
SW1952
LEAD IN
SW1953
PLAYBACK
SW1954
RECORDING
SW1955
LOADING
SW1956
M901 MD SPINDLE MOTOR
M902 MD THREAD MOTOR
M903 MD LOADING MOTOR

● For details regarding schematic diagram caution items, refer to page 16.

PWB-B
(MD MECHANISM SWITCH ASSY)

SW 1952: DIRECT	ON-OFF
SW 1953: LEAD IN	ON-OFF
SW 1954: PLAYBACK	ON-OFF
SW 1955: RECORDING	ON-OFF
SW 1956: LOADING	ON-OFF

6 – 9 insert 100K 270P circuit and measure.

IC1201
LR37648A
ENCODE/DECODE/ATRAC

IC1202
IX2474AF
4M bit D-RAM

IC1907
TC9246F
CLOCK
GENERATOR

IC1990
74AC04FS
INVERTER

AND GATE
IC1906
TC7ST08F

AND GATE
IC1916
74VHC08F

IC1701
UDA1340
AD/DA CONVERTER

REGULATOR
IC1801
XC62EP32

REGULATOR
Q1701
2SC2412KR
IC1802
NJM431U

IC1402
S29294A
E²-PROM

A 1/2
CN304

A 1/2
CN303

MD FLEXIBLE PCB

: MD PLAYBACK SIGNAL

: MD RECORDING SIGNAL

■ Voltages of MD MAIN ASSY

Q1801	
PIN NO.	VOLTAGE
E	5V
C	5V
B	43V

Q1802	
PIN NO.	VOLTAGE
E	0V
C	0V
B	0.15V

Q1803	
PIN NO.	VOLTAGE
E	0V
C	0V
B	3.1V

Q1807	
PIN NO.	VOLTAGE
E	3.95V
C	3.2V
B	3.3V

Q1820	
PIN NO.	VOLTAGE
E	3.2V
C	3.18V
B	2.4V

Q1821	
PIN NO.	VOLTAGE
E	0V
C	0V
B	3.08V

Q1822	
PIN NO.	VOLTAGE
E	0V
C	0V
B	0.1V

Q1451	
PIN NO.	VOLTAGE
E	0V
C	3.18V
B	0.1V

Q1401	
PIN NO.	VOLTAGE
E	3.2V
C	3.2V
B	0V

Q1402	
PIN NO.	VOLTAGE
E	0V
C	0V
B	2.3V

Q1403	
PIN NO.	VOLTAGE
E	3.18V
C	0V
B	3.15V

IC1907	
PIN NO.	VOLTAGE
1	2.8V
2	2.6V
3	4.9V
4	2.6V
5	1.6V
6	0V
7	0V
8	4.9V
9	0V
10	2.2V
11	5V
12	5V
13	0V
14	3.2V
15	3.1V
16	5V

IC1990	
PIN NO.	VOLTAGE
1	1.45V
2	1.7V
3	1.45V
4	1.7V
5	1.45V
6	1.7V
7	0V
8	1.7V
9	1.45V
10	1.37V
11	1.7V
12	1.37V
13	1.7V
14	3.17V

IC1202	
PIN NO.	VOLTAGE
1	1.1V
2	1.1V
3	3V
4	2V
5	1.5V
6	1.8V
7	0.8V
8	2.4V
9	1.2V
10	3.2V
11	1.2V
12	2.5V
13	1.3V
14	1.7V
15	1.3V
16	2.2V
17	2.4V
18	1.2V
19	1.1V
20	0V

IC1101	
PIN NO.	VOLTAGE
1	0.7V
2	0.7V
3	0.7V
4	0.7V
5	1.6V
6	1.6V
7	0.7V
8	1.6V
9	1.6V
10	1.6V
11	1.6V
12	1.6V
13	3.2V
14	3.2V
15	0V
16	Groove:3.2V Pit:0V
17	Low-reflectance: 0V High-reflectance: 3.2V
18	0V
19	0V
20	1.45V
21	3.2V
22	0V
23	0V
24	3.2V
25	1.78V
26	1.78V
27	1.35V
28	1.36V
29	1.6V
30	1.6V
31	1.6V
32	1.6V
33	1.6V
34	0V
35	1.6V
36	1.6V
37	0.3V
38	1.6V
39	1.6V
40	1.6V
41	1.6V
42	3.2V
43	0V
44	1V
45	1.6V
46	1.6V
47	0.7V
48	0.7V

Q1404	
PIN NO.	VOLTAGE
E	0V
C	3.15V
B	2.1V

Q1601	
PIN NO.	VOLTAGE
E	5.45V
C	4.4V
B	4.8V

IC1201			
PIN NO.	VOLTAGE	PIN NO.	VOLTAGE
1	1.48V	51	58V
2	0V	52	0V
3	1.6V	53	0V
4	0V	54	58V
5	1.36V	55	0V
6	1.77V	56	0V
7	1.6V	57	3.2V
8	1.36V	58	3.2V
9	1.77V	59	3.2V
10	1.25V	60	3.17V
11	1.6V	61	0V
12	3.17V	62	3.17V
13	0V	63	0V
14	0V	64	1.3V
15	0V	65	1.3V
16	0V	66	DIC input:1.58V Other:0V
17	1.45V		
18	1.56V	67	1.58V
19	1.62V	68	3.17V
20	1.7V	69	0V
21	1.5V	70	1.5V
22	1.63V	71	1.55V
23	1.53V	72	1.5V
24	1.8V	73	0V
25	1.4V	74	1V
26	1.2V	75	1.55V
27	2.5V	76	1.8V
28	0.8V	77	1.56V
29	1.8V	78	0V
30	1.4V	79	0V
31	3.2V	80	3.16V
32	1.2V	81	0V
33	2.5V	82	0V
34	1.3V	83	0V
35	1.7V	84	1.5V
36	1.3V	85	1.5V
37	2.2V	86	3.1V
38	0V	87	3.17V
39	2.4V	88	0V
40	1.2V	89	3.17V
41	1.1V	90	0.5V
42	1.5V	91	0.6V
43	2V	92	0.4V
44	3V	93	0.4V
45	1.1V	94	0.4V
46	1.1V	95	0.9V
47	0V	96	0.7V
48	3V	97	0.8V
49	1.56V	98	3.16V
50	PLAY:0V REC:1.5V	99	3.15V
		100	0V

IC1801	
PIN NO.	VOLTAGE
1	0V
2	44V
3	3.2V
4	3.1V
5	0V

IC1901	
PIN NO.	VOLTAGE
1	5.5V
2	1.6V
3	0V
4	2.8V
5	5.5V

IC1401			
PIN NO.	VOLTAGE	PIN NO.	VOLTAGE
1	0V	51	0V
2	0V	52	0V
3	0.2V	53	0V
4	3.2V	54	0V
5	0V	55	0V
6	0V	56	0V
7	3.1V	57	0V
8	0V	58	0V
9	0V	59	3.2V
10	0V	60	0V
11	0V	61	3.2V
12	3.18V	62	3.2V
13	144V	63	0V
14	0V	64	0V
15	1.5V	65	3.2V
16	3.2V	66	3.2V
17	3.2V	67	3.2V
18	3.1V	68	0V
19	0V	69	0V
20	0V	70	3.1V
21	0V	71	0V
22	3.15V	72	3.1V
23	3.2V	73	97A:0V
24	0V		97B:3.2V
25	3.2V	74	0V
26	3.2V	75	3.2V
27	0V	76	3.2V
28	0V	77	0V
29	2V	78	0V
30	3.2V	79	0V
31	0V	80	3.15V
32	3.2V	81	0V
33	0V	82	0V
34	0.8V	83	3.2V
35	2.2V	84	3.2V
36	0.2V	85	3.2V
37	2.3V	86	3.2V
38	0V	87	3.2V
39	PLAY:3.15V REC:0V	88	3.2V
		89	1.7V
40	0V	90	1.8V
41	0V	91	1.8V
42	0V	92	1.4V
43	3.2V	93	Low-reflectance: 2.2V High-reflectance: 0.1V
44	0V		
45	0V		
46	3.15V		
47	0V	94	3.2V
48	0V	95	3.2V
49	0V	96	0V
50	0V	97	2V
		98	3.2V
		99	3.2V
		100	0V

IC1601	
PIN NO.	VOLTAGE
1	1.25V
2	4V
3	1.5V
4	5.5V
5	5.5V
6	1.5V
7	5V
8	2.7V
9	2.8V
10	0V
11	0V
12	2.7V
13	2.76V
14	1.6V
15	1.6V
16	1.6V
17	3.15V
18	3.15V
19	0V
20	1.6V
21	1.6V
22	1.6V
23	1.23V
24	1.23V
25	1.6V
26	1.6V
27	1.62V
28	2.7V
29	2.8V
30	2.7V
31	2.7V
32	0V
33	0V
34	3.0V
35	2.4V
36	0V
37	1.64V
38	5.5V
39	5.5V
40	1.64V
41	1.68V
42	1.68V

IC1251	
PIN NO.	VOLTAGE
1	2.6V
2	2.6V
3	0.1V
4	2.6V
5	2.6V
6	0.1V
7	0V
8	1.56V
9	0.1V
10	2.6V
11	1.56V
12	0.1V
13	2.6V
14	5.2V

Q1251	
PIN NO.	VOLTAGE
D	4.4V
S	1.4V
G	2.6V

Q1252	
PIN NO.	VOLTAGE
D	4.4V
S	1.4V
G	2.6V

Q1253	
PIN NO.	VOLTAGE
D	15V
S	0V
G	2.6V

Q1254	
PIN NO.	VOLTAGE
D	15V
S	0V
G	2.6V

IC1701	
PIN NO.	VOLTAGE
1	0V
2	3.2V
3	1.4V
4	1.5V
5	1.4V
6	0V
7	3.2V
8	0V
9	0V
10	3.2V
11	0V
12	1.5V
13	3.17V
14	3.17V
15	3.17V
16	1.55V
17	3.17V
18	0V
19	1V
20	0V
21	0V
22	0V
23	3.2V
24	1.57V
25	3.2V
26	1.57V
27	0V
28	1.6V

IC1916	
PIN NO.	VOLTAGE
1	1.58V
2	3.2V
3	1.58V
4	3.2V
5	DIG input:2.2V Other:0V
6	DIG input:1.58V Other:0V
7	1.55V
8	2.2V
9	3.2V
10	3.2V
11	97A:3.2V 97B:1V
12	97A:3.2V 97A:0.9V

Q1804	
PIN NO.	VOLTAGE
E	5.4V
C	5.4V
B	4.8V

Q1805	
PIN NO.	VOLTAGE
E	0V
C	0.7V
B	3.1V

Q1701	
PIN NO.	VOLTAGE
E	3.2V
C	5.4V
B	3.85V

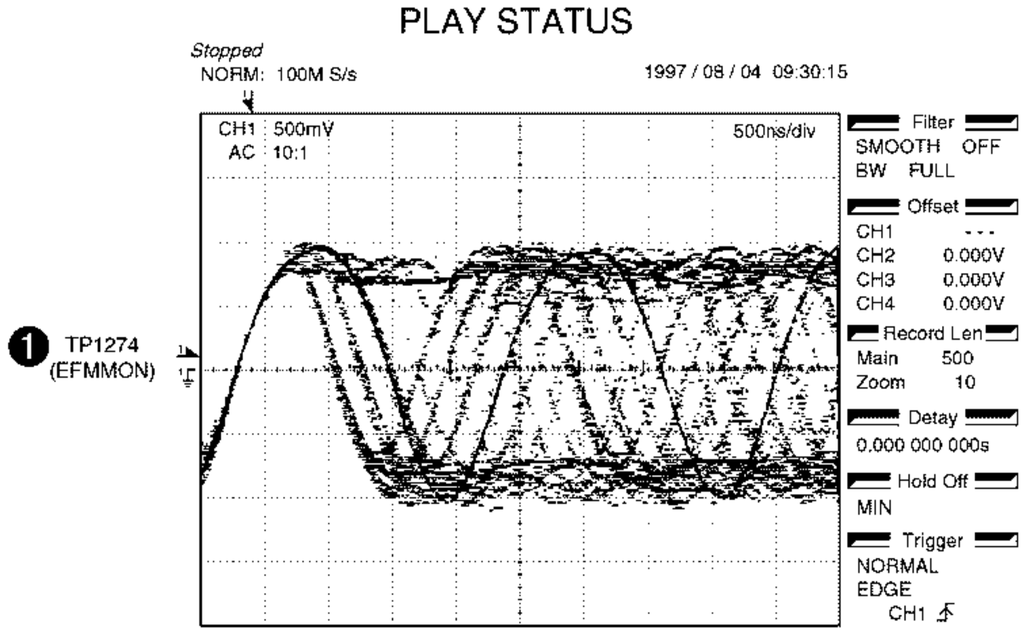
IC1802	
PIN NO.	VOLTAGE
1	2.46V
2	0V
3	3.85V

IC1402	
PIN NO.	VOLTAGE
1	0V
2	3.2V
3	3.2V
4	3.2V
5	0V
6	0V
7	0V
8	0V

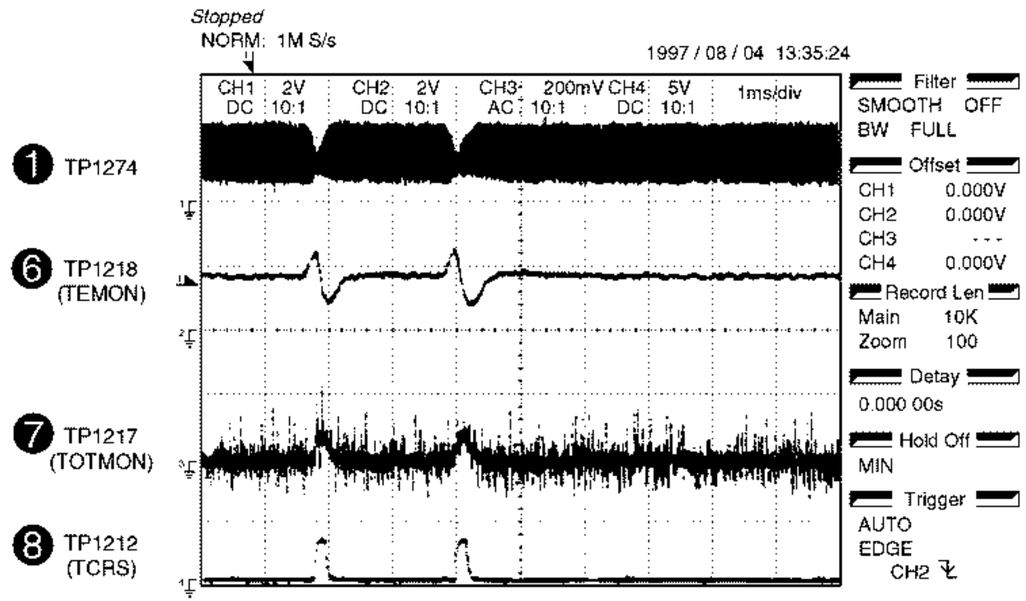
■ NOTES FOR SCHEMATIC DIAGRAMS

- Resistance values unless otherwise specified are in Ω.
  "K" means 1000Ω, and "M" means 1000kΩ.
- Capacitors unless otherwise specified are in μF.
  "P" is an abbreviation for pF.
- Capacitors indicated as (CH), (RH), (TH), (UJ), (CK), etc. are ceramic tempetature compensation types.
  Capacitors indicated as (ML) are Mylar type.
- For electrolytic capacitors, indication is in the order of capacity and voltage resistance.
- Parts indicated with the ⚠ mark (⚠ mark) are important for safety reasons. Be sure to use the designated parts for replacement in order to ensure safety and performance.
- Voltage value indicated in each part is without signal, as measured with a digital multimeter.
- The schematic and PCB diagrams are subject to change for improved performance. Thus, they may be slightly different, depending on the set.

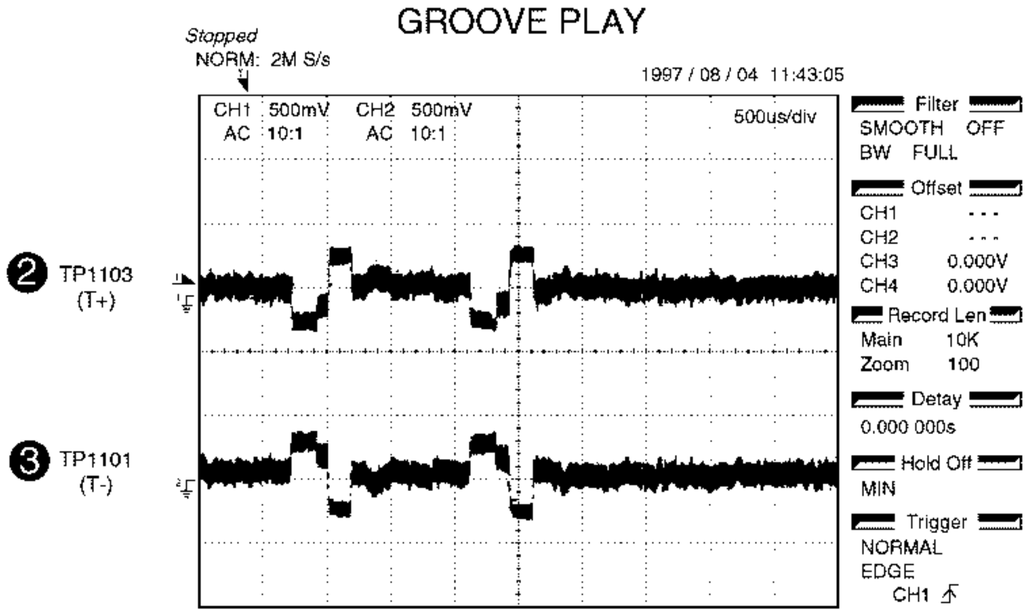
PLAY STATUS



PIT PLAY



GROOVE PLAY



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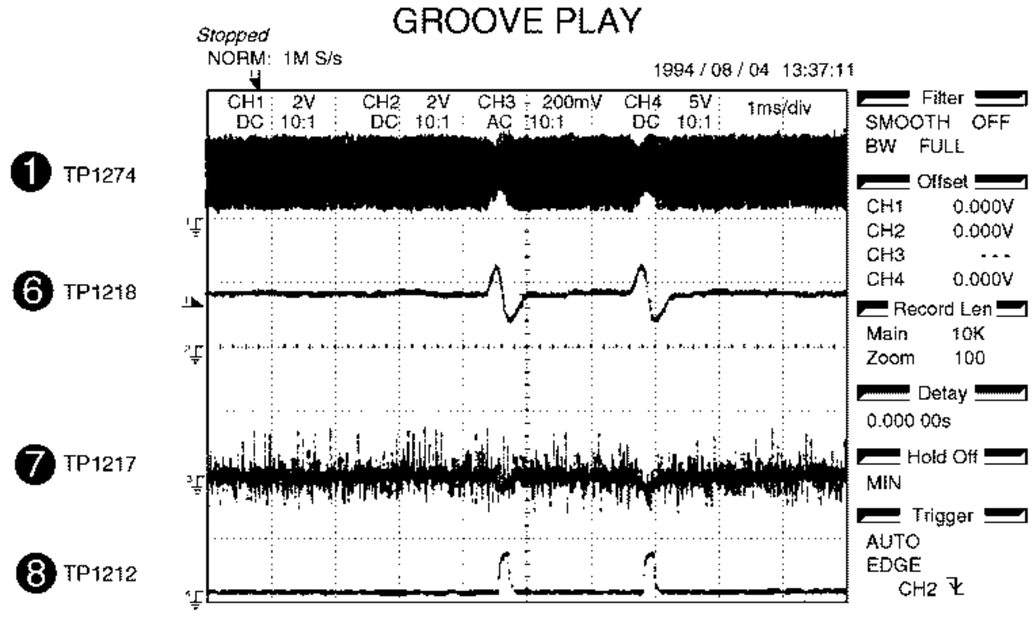
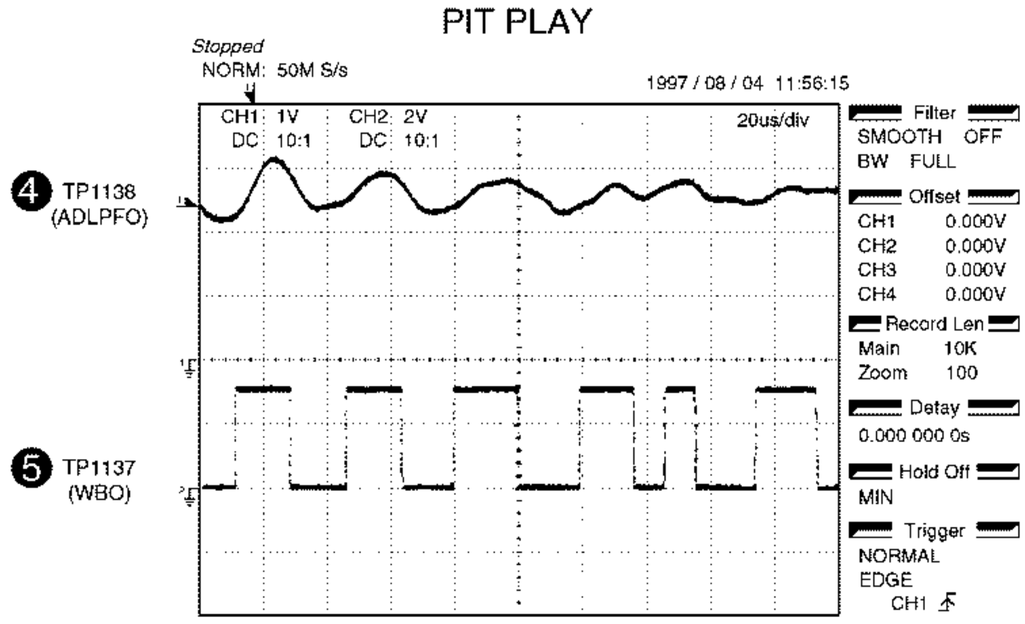
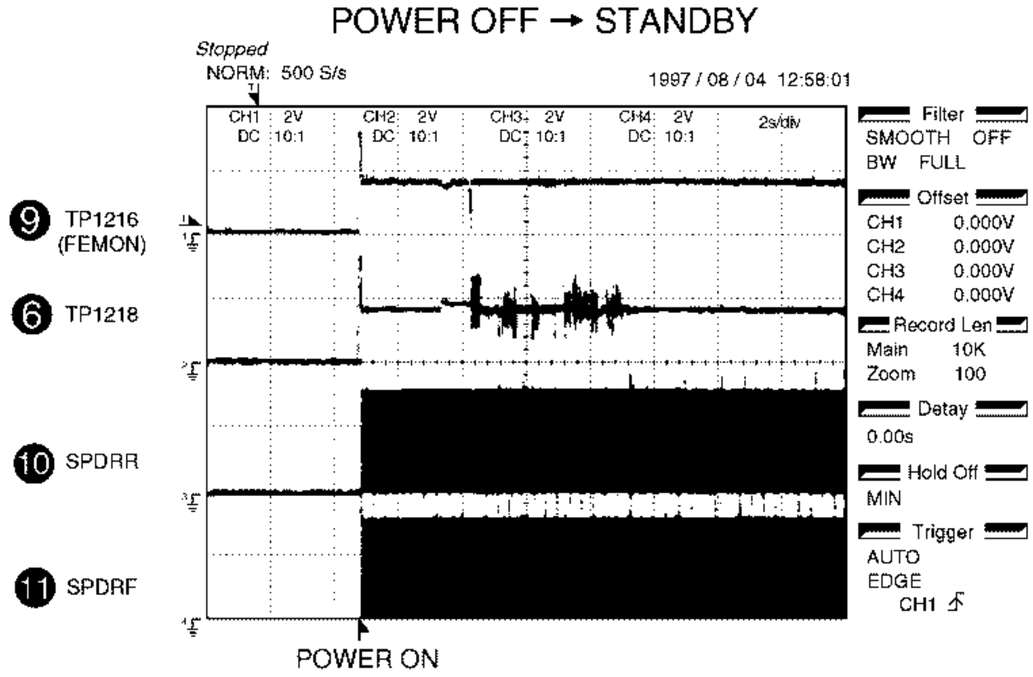


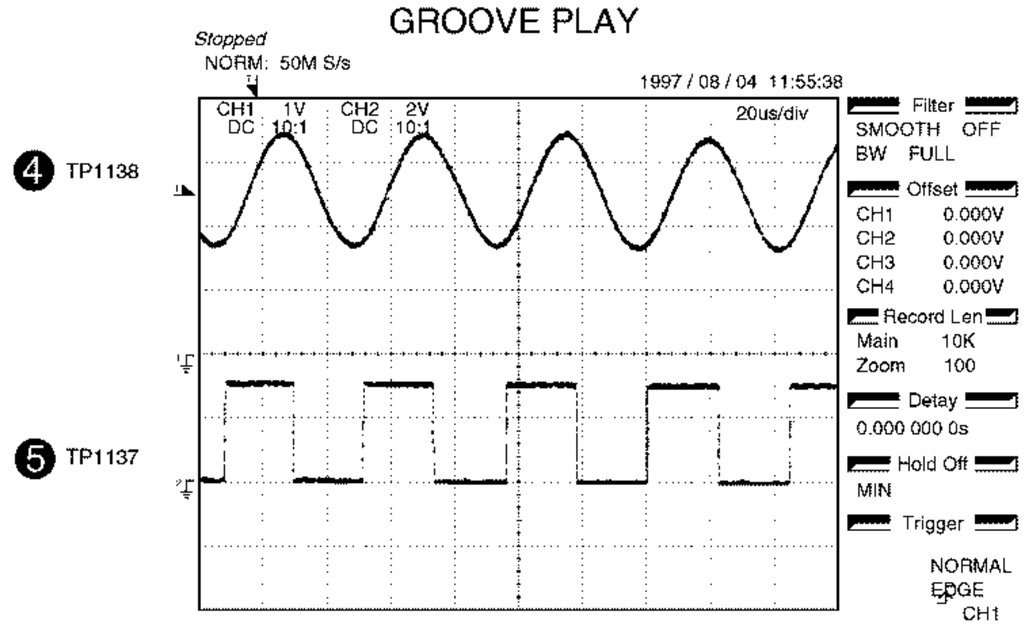
PIT PLAY



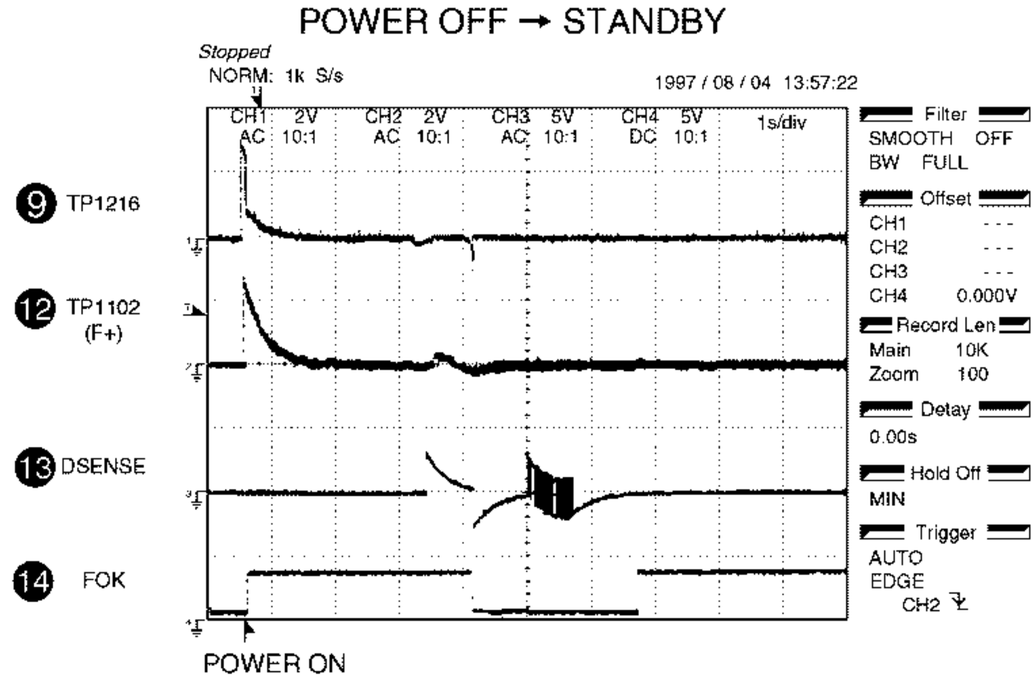
POWER OFF → STANDBY



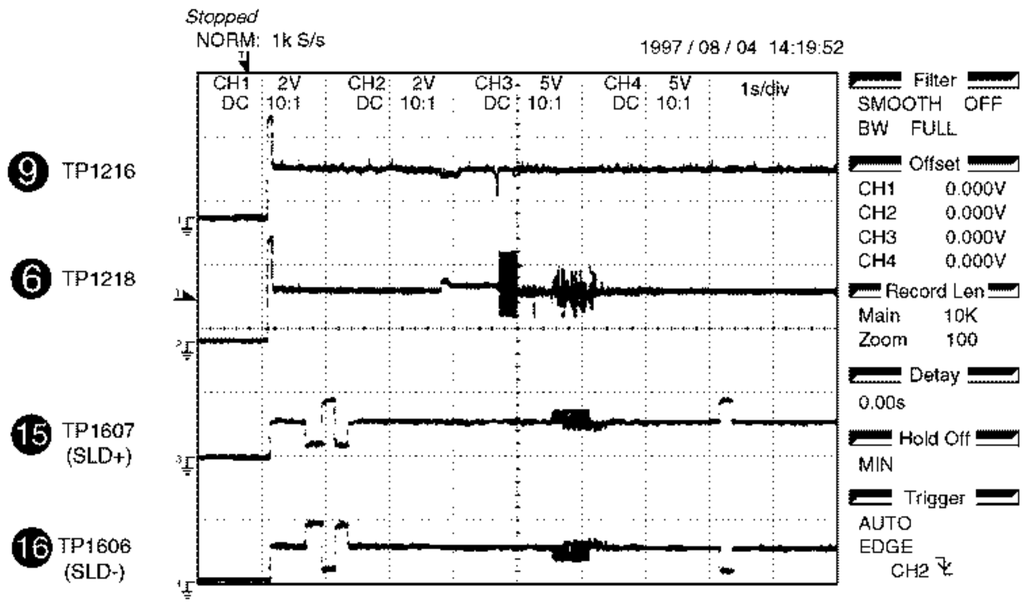
GROOVE PLAY

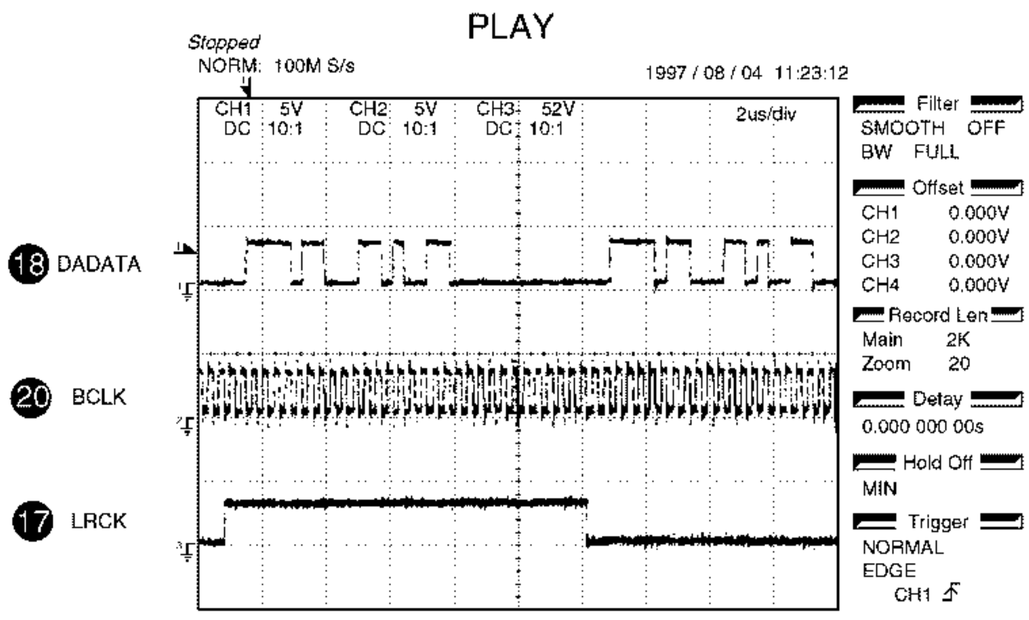


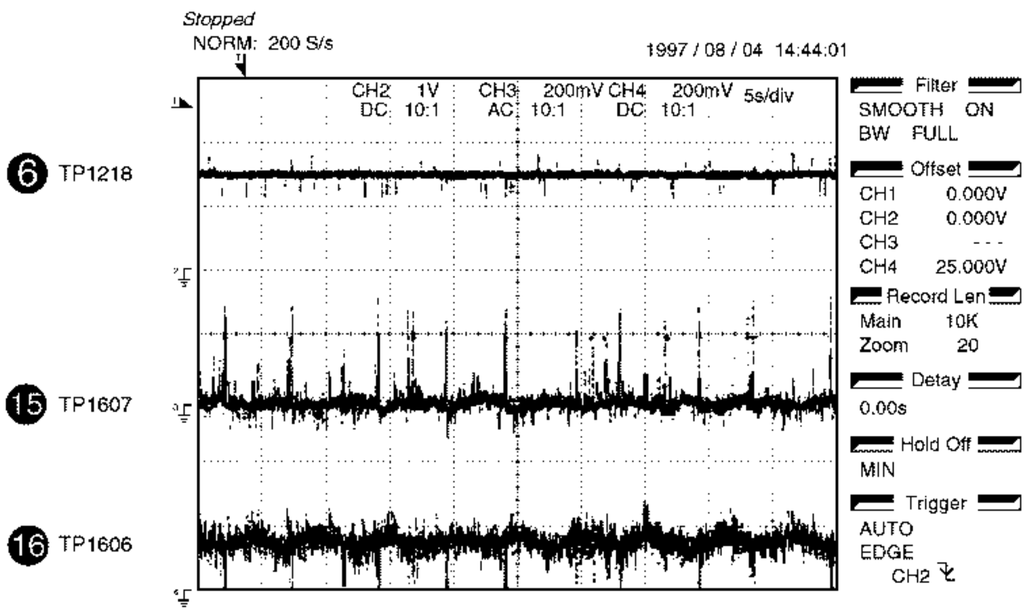
POWER OFF → STANDBY

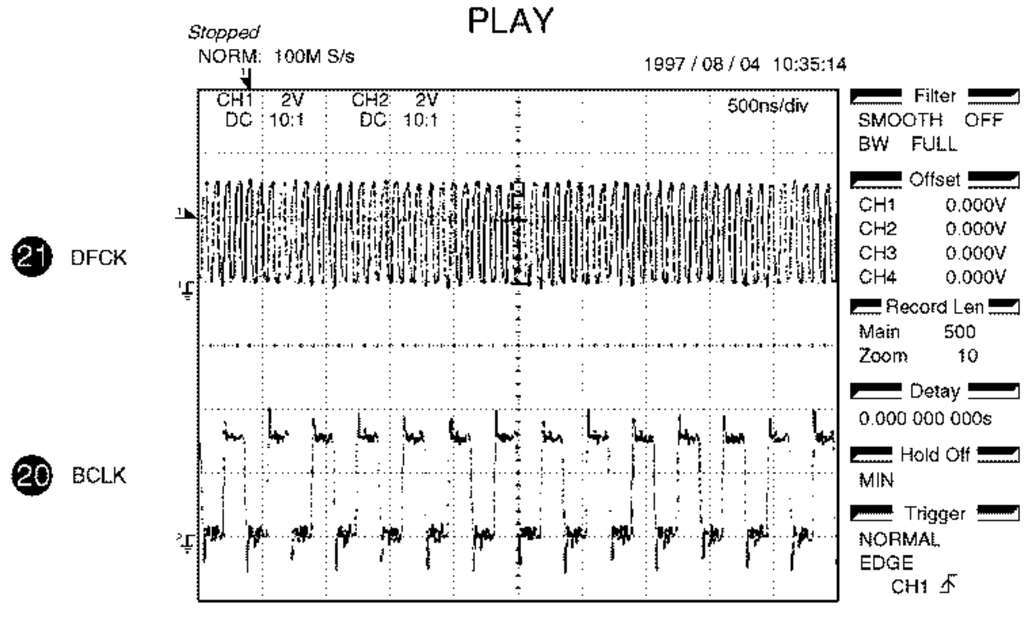


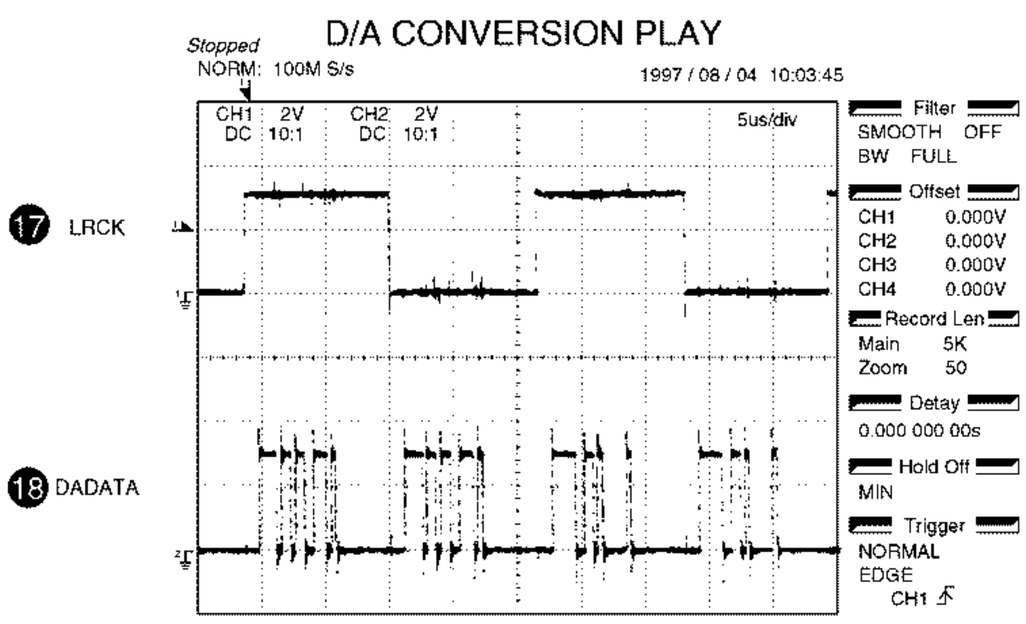
MJ-R5

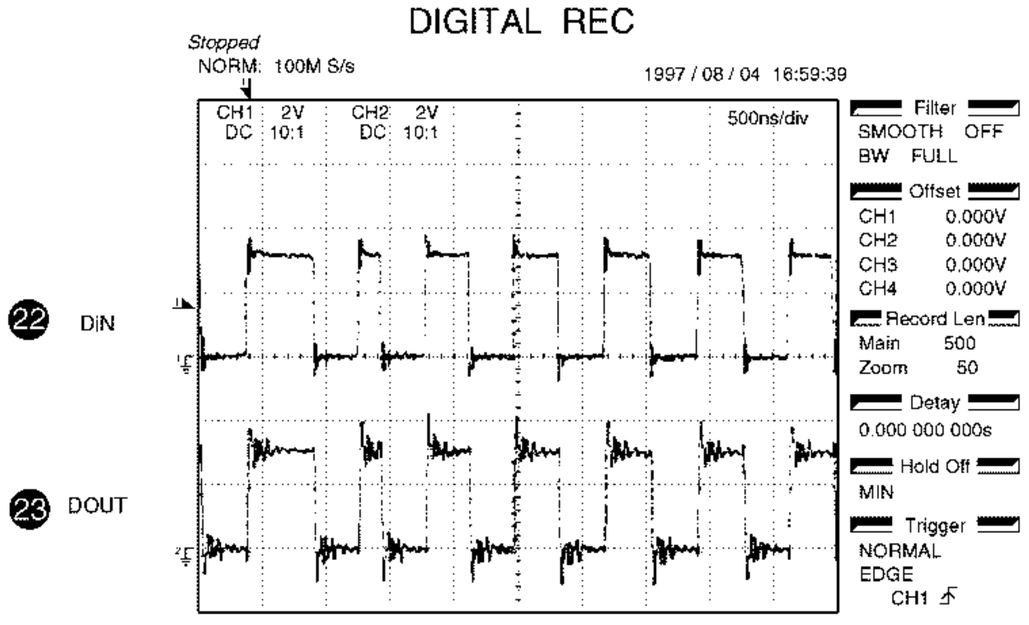




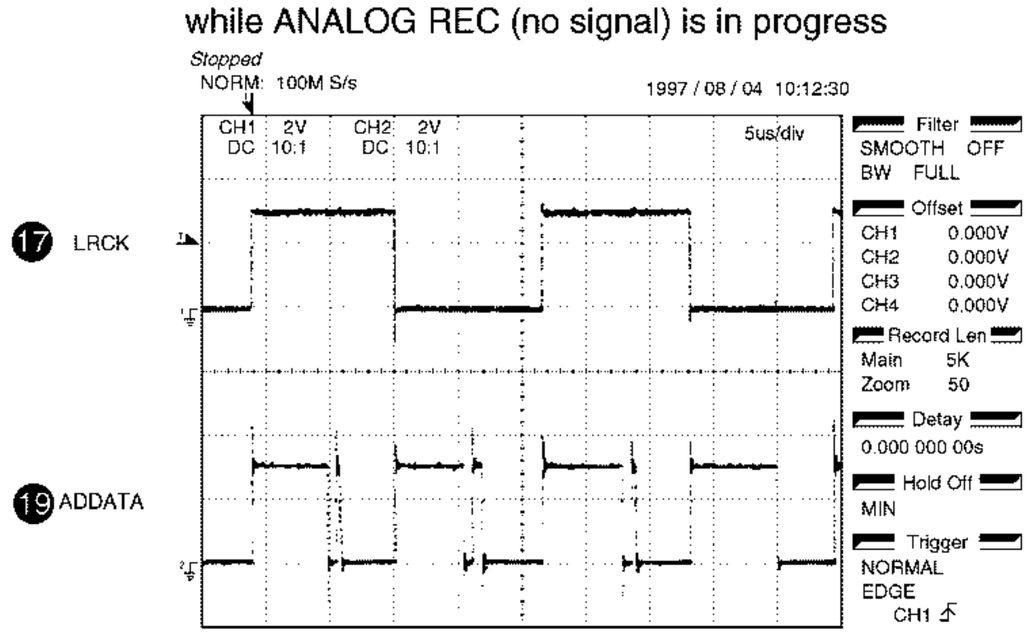




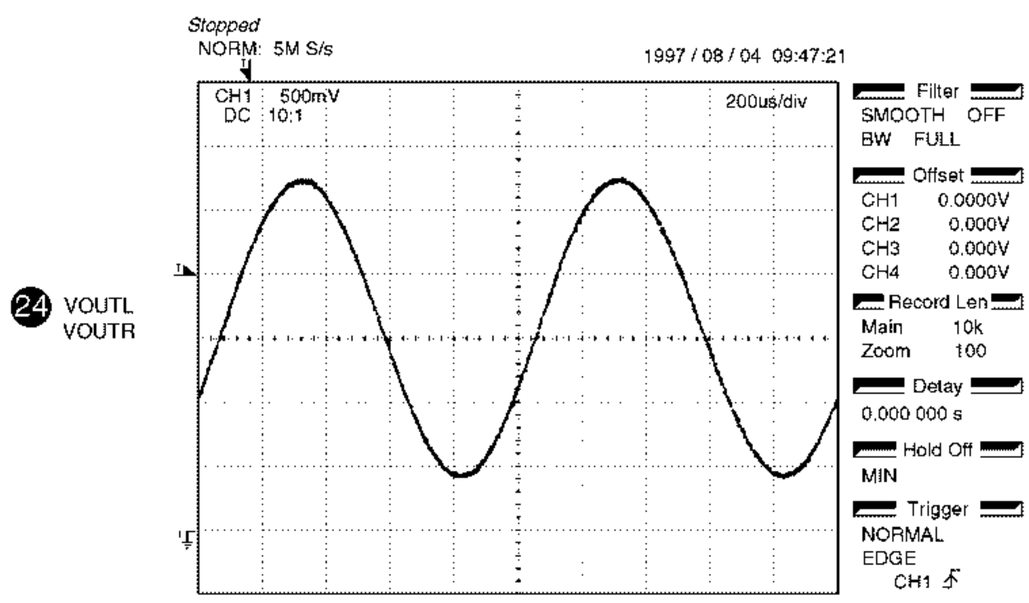




A/D CONVERSION
while ANALOG REC (no signal) is in progress



1 kHz 0dB Sine Wave PLAY



4. PCB CONNECTION DIAGRAM

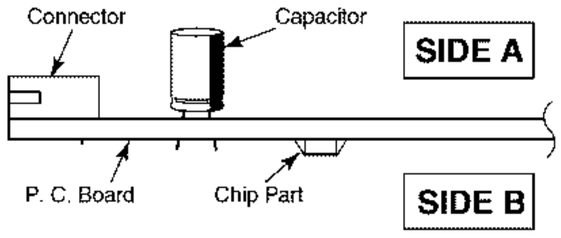
4.1 PWB–B (MD MECHANISM SWITCH ASSY)

NOTE FOR PCB DIAGRAMS:

1. Part numbers in PCB diagrams match those in the schematic diagrams.
2. A comparison between the main parts of PCB and schematic diagrams is shown below.

Symbol in PCB Diagrams	Symbol in Schematic Diagrams	Part Name
B C E	B C E B C E	Transistor
B C E	B C E B C E	Transistor with resistor
D G S	D G S D G S	Field effect transistor
		Resistor array
		3-terminal regulator

3. The parts mounted on this PCB include all necessary parts for several destination.
   For further information for respective destinations, be sure to check with the schematic diagram.
4. Viewpoint of PCB diagrams



■ Forms of Transistor and Diodes

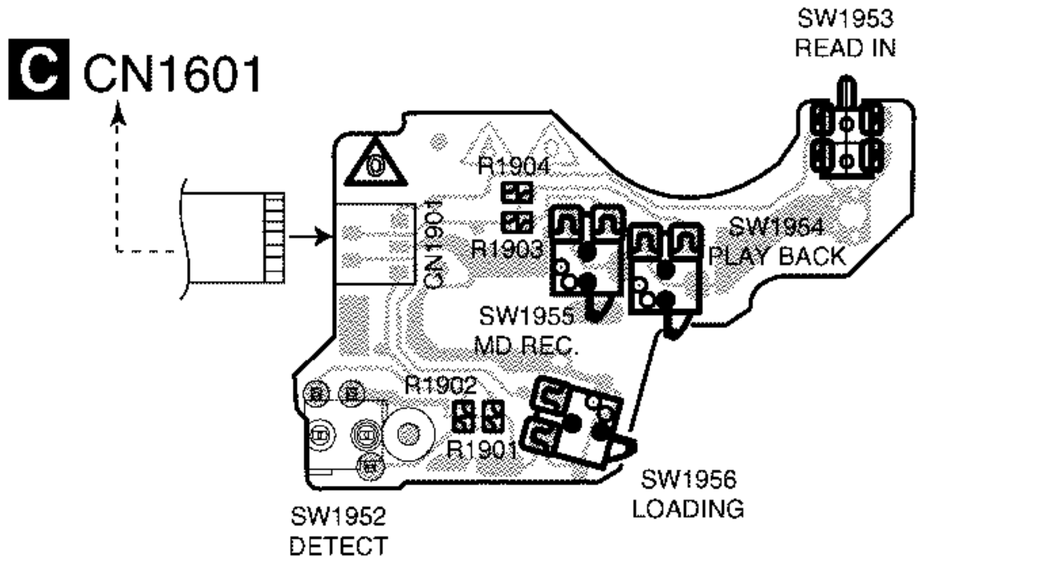
RN2404
RNC1407
RNC1404
RN1406

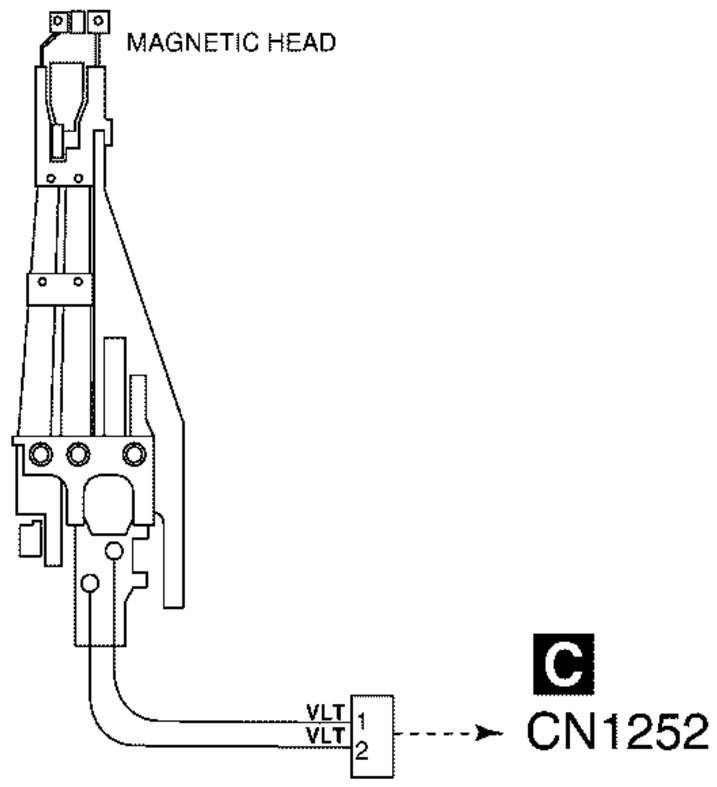
2SK1473

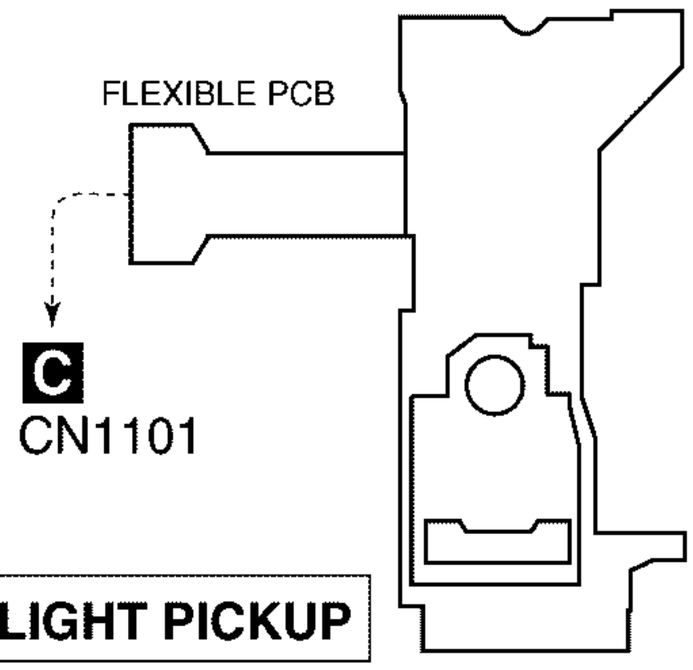
2SA1162 G
2SC2412 KR
2SK2909

2SA1314 C

D PWB-B (MD MECHANISM SWITCH ASSY)







MD LIGHT PICKUP

SIDE A

4.2 PWB–A (MD MAIN ASSY)

SIDE A
(TOP VIEW)

C **PWB-A (MD MAIN ASSY)**

A **CN303** MAGNETIC HEAD

MD Flexible PCB
24 — 1

Q1251
Q1820
Q1252
Q1253
Q1254
Q1822
Q1821
Q1451
Q1403
Q1404
IC1251
Q1804
Q1806
IC1916
IC1701
IC1907
Q1701
IC1906
IC1202
IC1990
IC1201
Q1601

M901 MD SPINDLE MOTOR (RED / BLK)
M902 MD THREAD MOTOR (RED / BLK)

MD LIGHT PICKUP

❶ – ㉔ are waveform Nos. on pages 17 and 18.

SIDE B

(TOP VIEW)

C **PWB-A**
(MD MAIN ASSY)

A CN304

D CN1901- →

M903
MD
LOADING
MOTOR

BLK

RED

Q1807
IC1801
Q1801

Q1802
Q1803

IC1802

IC1401
Q1402

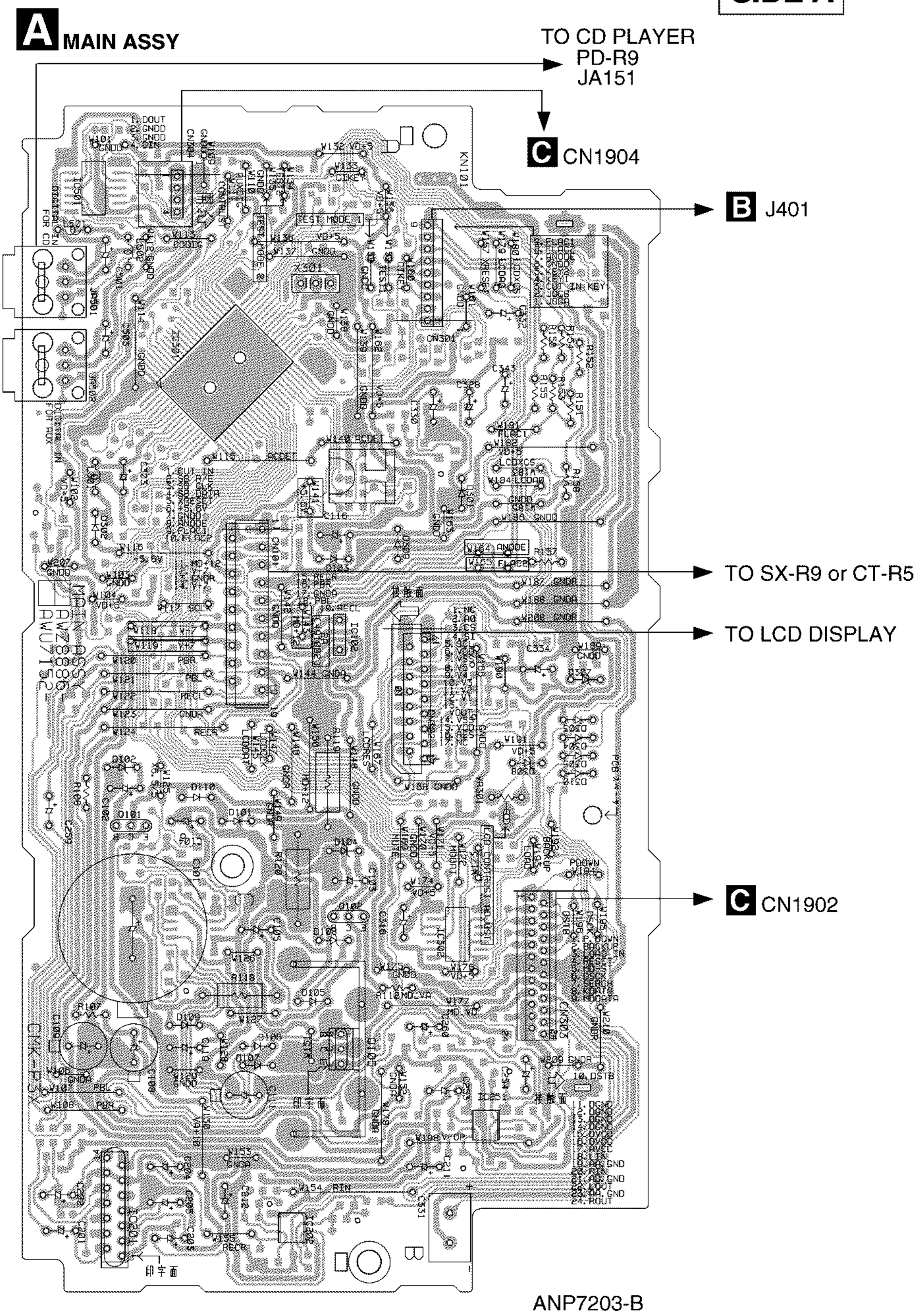
IC1402
Q1401

IC1601

IC1101

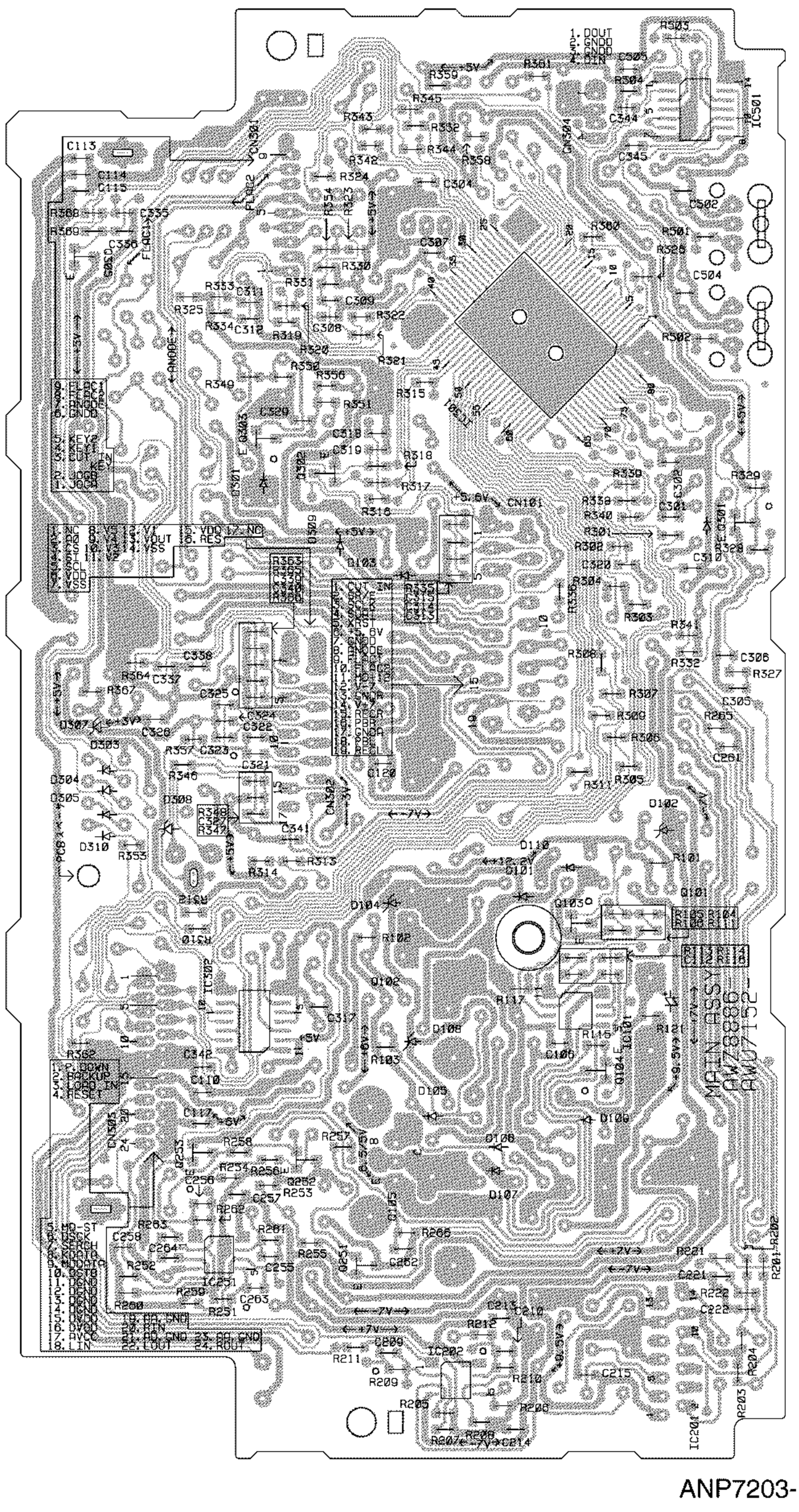
4.3 MAIN ASSY

SIDE A



SIDE B

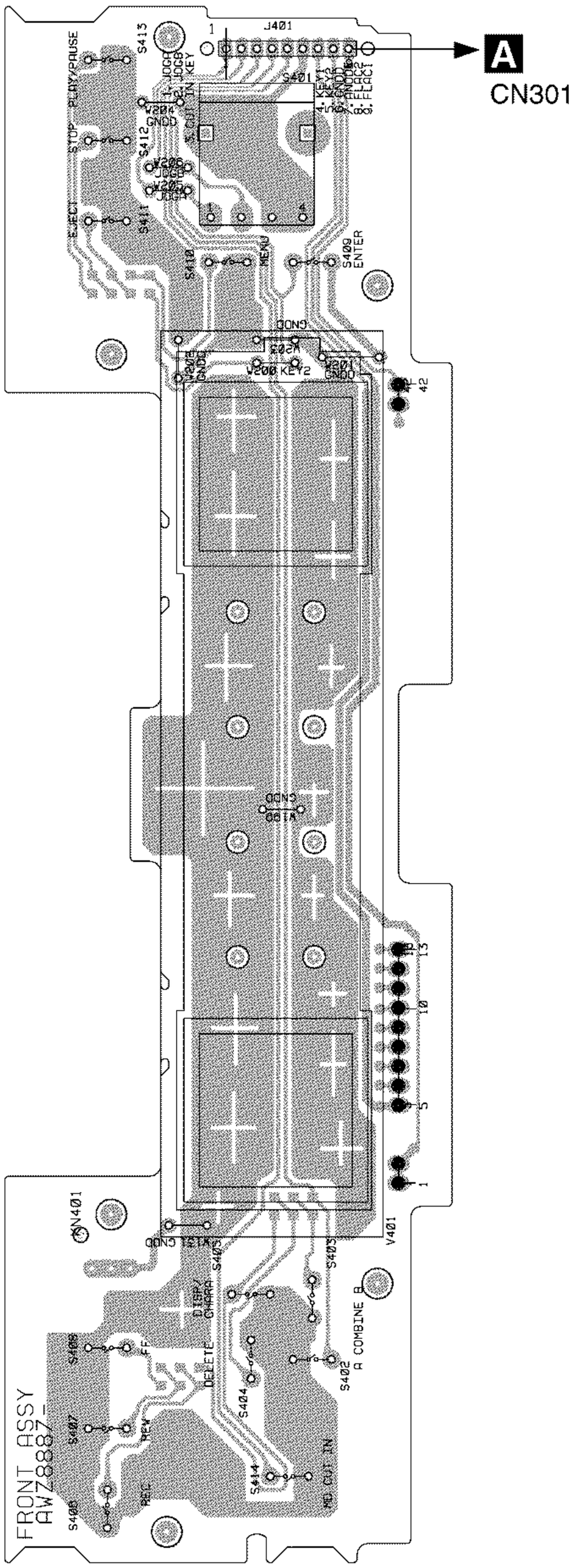
A MAIN ASSY



4.4 FRONT ASSY

SIDE A

B FRONT ASSY



5. PCB PARTS LIST

NOTES :
- *Parts marked by "* NSP *" are generally unavailable because they are not in our Master Spare Parts List.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

Ex. 1 *When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).*

560 Ω → 56 × 10¹ → 561 ..... RD1/4PU 5 6 1 J
47k Ω → 47 × 10³ → 473 ..... RD1/4PU 4 7 3 J
0.5 Ω → R50 ..... RN2H R 5 0 K
1 Ω → 1R0 ..... RS1P 1 R 0 K

Ex. 2 *When there are 3 effective digits (such as in high precision metal film resistors).*

5.62k Ω → 562 × 10¹ → 5621 ..... RN1/4PC 5 6 2 1 F

Mark	No.	Description	Part No.

LIST OF PCB ASSEMBLIES

NSP	MD MAIN ASSY	AWM7389
	├ MAIN ASSY	AWU7152
	└ FRONT ASSY	AWZ8887
NSP	MD MAIN ASSY	AZW7246
	PWB-A (MD MAIN ASSY)	1246840167
NSP	MD MECHANISM SWITCH ASSY	AZW7247
	PWB-B (MD MECHANISM SWITCH ASSY)	1245210149

A MAIN ASSY

SEMICONDUCTORS

⚠	IC102 (PROTECTOR 2A)	AEK7013-A
	IC202, IC251	BA4558F-HT
	IC201	M51131L
	IC101	NJM2904M
	IC301	PDG227A
	IC501	TC74HC00AF
	IC302	TC74HCT08AF
	Q104, Q303, Q305	2SC2412K
	Q101	2SC2458
	Q102	2SD1859X
	Q251, Q252	2SD2114K
	Q105	2SD2395
	Q253	DTA143EK
	Q103, Q302	DTC124EK
	Q301	DTC143EK
	D301–D305, D309, D310	1SS254
	D102	MTZJ10C
	D307	MTZJ3.0B
	D308	MTZJ4.7B
	D108	MTZJ5.1A
	D104	MTZJ6.8B
	D101, D103, D105–D107	S5688G
	D109, D110	S5688G

COILS AND FILTERS

	L501, L502 (10 µH)	LAU100J
	L301 (47 µH)	LAU470J

CAPACITORS

	C331 (0.047 F/5V)	ACH1246
	C101 (2200µF/16V)	ACH7078
	C313–C315	CCSQCH101J50
	C337–C340	CCSQCH221J50
	C263, C264	CCSQCH470J50
	C104,C105, C201–C205	CEAT100M50
	C253, C254, C259, C260	CEAT100M50
	C108,C109,C116	CEAT101M10
	C330, C332	CEAT1R0M50
	C102, C103, C119, C316, C334	CEAT470M16
	C111	CEAT471M10
	C303	CEAT471M6R3
	C328	CEATR47M50
	C501, C503	CEJA470M16
	C329	CKSQYB102K50
	C106,C110, C117, C120	CKSQYB103K50
	C213–C215, C257, C258	CKSQYB103K50
	C301,C302, C304, C307–C312	CKSQYB103K50
	C317,C326, C327, C344, C345	CKSQYB103K50
	C502,C504, C505	CKSQYB103K50
	C221,C222, C305, C306	CKSQYB104K25
	C335, C336	CKSQYB104K25
	C318–C320	CKSQYB471K50
	C341	CKSQYB473K50
	C113, C114, C321–C325, C342	CKSQYF104Z50

RESISTORS

	R151–R158	RD1/4PU100J
	R107, R108	RD1/4PU470J
	R118	RS1LMF181J
	R120	RS2LMF120J
	R119	RS2LMF8R2J
	Other Resistors	RS1/10S□□□J

OTHERS

CN301	9P CONNECTOR(2mmP)	52147-0910
CN302	17P FFC CONNECTOR	9604S-17C
CN101	19P CONNECTOR	AKP7002
	HEAT SINK	ANH1150
X301	CERAMIC OSC(8.389MHz)	ASS7016
CN304	KR CONNECTOR	B4B-PH-K-S
JA501,JA502	OPTICAL LINK IN	GP1F32R
	PCB BINDER	VEF1040
CN303	24P FFC CONNECTOR	VKN1200
KN101	EARTH METAL FITTING	VNF1084

Mark	No.	Description	Part No.
B	**FRONT ASSY**		
	SWITCHES AND RELAYS		
	S402–S414		ASG1034
	S401	(ROTARY ENCODER)	ASX7019
	RESISTORS		
	All Resistors		RS1/10S□□□J
	OTHERS		
	401	9P CABLE HOLDER	51048-0900
	V401	FL INDICATOR TUBE	AAV7048
		FL SPACER	AEB7094
	KN401	EARTH METAL FITTING	VNF1084
C	**MD MAIN ASSY**		
	SEMICONDUCTORS		
	IC1101	(IR3R55)	1245730345
	IC1201	(LR37648A)	1245730418
	IC1202	(RH-IX2474AFZZ)	1245730207
	IC1251	(74ACT02F)	1245730043
	IC1401	(IX0232)	1245730417
	IC1402	(S29294A)	1245730301
	IC1601	(M56758FP)	1245730354
	IC1701	(UDA1340)	1245730357
	IC1801	(XC62EP32)	1245730367
	IC1802	(NJM431U)	1245730356
	IC1906	(TC7ST08F)	1245730152
	IC1907	(TC9246F)	1245730153
	IC1916	(74VHC08FT)	1245730368
	IC1990	(74AC04FS)	1245730044
	Q1251, Q1252	(2SK2909)	1245760042
	Q1253, Q1254	(2SK1473)	1245760016
	Q1401, Q1403	(RN2404)	1245760032
	Q1402, Q1404, Q1806	(RNC1404)	1305760402
	Q1451, Q1821, Q1822	(RNC1407)	1245760031
	Q1601, Q1801, Q1807	(2SA1314C)	1245760001
	Q1701	(2SC2412KR)	1115760132
	Q1802, Q1803	(RN1406)	1245760047
	Q1804, Q1820	(2SA1162G)	1305760552
	D1251, D1252	(SB0209CP-1)	1245700005
	D1990	(1SS372)	1245700008
	COILS AND FILTERS		
	L1101, L1701, L1702	(10µH)	1245850024
	L1102, L1201	(0.47µH)	1245850026
	L1203, L190	(4.7µH)	1245850025
	L1251	(47µH)	1245850002
	L1601, L1950	(1µH)	1246140023
	CAPACITORS		
	C1101, C1255, C1601, C1602		1245900039
	C1102, C1105, C1109, C1990		1245950017
	C1103, C1121, C1202, C1203		1305950342
	C1460, C1631, C1704, C1805,C1810		1305950342
	C1104		1425950018
	C1106, C1110, C1953		1245950016
	C1107		1305950192
	C1111		1305950274
	C1112–C1116		1185930004
	C1119		1425930083
	C1145		1305950396
	C1204, C1205		1305930581
	C1206, C1207, C1209–C1211, C1406		1305950342
	C1208, C121, C1401, C1402, C1425		1305950397
	C1702, C1709, C1927, C1951, C1955		1305950397
	C1958		1305950397
	C1251		1305950360
	C1252		1425930040
	C1254, C1610, C1803, C1806, C1991		1245900038
	C1403, C1412		1305950311
	C1405, C1992		1425950096
	C1407, C1421–C1424		1305950393
	C1604		1305930592
	C1605, C1661, C1802		1245940005
	C1609		1305950261
	C1650–C1653		1425930084
	C1654, C1655		1185950005
	C1656, C1657		1305950331
	C1700, C1701, C1711, C1716, C1717		1305950271
	C1703, C1710, C1712, C1714, C1743		1425940037
	C1706, C1707		1425900305
	C1715		1245940006
	C172, C1729		1185930010
	C1720, C1952		1305950316
	C1722, C1724		1305930530
	C1801		1275950006
	C1807		1265940014
	C1904		1425950126
	C1913		1305930558
	C1954		1305930557
	C1956		1185940016
	C1957		1185940013
	C1964		1305950338
	RESISTORS		
	R1100		1425810093
	R1102		1305810927
	R1105		1305810925
	R1106, R1261–R1263, R1266, R1405		1305810909
	R1107		1185810057
	R1150–R1154, R1666, R1667		1305810950
	R1155, R1612		1305810928
	R1166		1425810154
	R120, R1211, R1221, R1464, R1466		1305810918
	R1201		1305810949
	R1202, R1701		1305810944
	R1210, R1961		1305810907
	R1223		1305810673
	R1251		1305810995
	R1252, R1253, R170, R171, R196		1305810630

Mark	No.	Description	Part No.
	R1254		1305810608
	R1255, R1269, R1620, R1921		1305810934
	R1281, R1731, R1733, R1967		1305810994
	R1401, R1404, R1409, R1415,R1420		1305810908
	R1406, R1407, R1413, R1452		1305810922
	R1408, R1412, R1473, R1651, R1653		1305810910
	R1414, R1416, R1422–R1424		1305810909
	R1418, R1472, R1617, R1734, R1735		1305810937
	R1425		1305810990
	R1426, R1428, R1454, R1456		1305810908
	R1427		1305810946
	R1429, R1430, R1459, R1461, R1463		1305810909
	R1458, R1460, R1462, R1654, R1656		1305810929
	R1471, R1478, R1650, R1652, R1662		1305810909
	R1474–R1476, R1810, R1939		1305810908
	R1609, R1963		1305810948
	R1610		1245810110
	R1611		1245810079
	R1613, R1808, R1811		1305810989
	R1614		1245810060
	R1655, R1657		1305810912
	R1658, R1660		1305810914
	R1659, R1661		1305811002
	R1663, R1665		1245810086
	R1664, R1965		1305810909
	R1668, R1669, R1964, R1973		1305810929
	R1702		1305810930
	R1707, R1708		1185810009
	R1710		1305811041
	R1711, R1713, R1714		1305810992
	R1712		1305810910
	R1715		1245810105
	R1716		1245810082
	R1717		1305810952
	R1801		1305810935
	R1802, R1827		1305810957
	R1804		1245810056
	R1805		1245810087
	R1806, R1807		1425810196
	R1809		1305810924
	R1820, R1821		1425810157
	R1901		1305810732
	R1902		1305810605
	R1903, R1904		1305810618
	R1927		1305810607
	R1947		1305810671
	R1962		1305810920
	R1968, R1974		1305810918
	R1969		1185810011
	R1994, R1995		1305810919

OTHERS

X1201	LC OSC (33.8688MHz)	1246160018

Mark	No.	Description	Part No.

D MD MECHANISM SWITCH ASSY

SWITCHES AND RELAYS

SW1956	PUSH SWITCH	1245300025
SW1954, SW1955	PUSH SWITCH	1245300026
SW1952	PUSH SWITCH	1245300027
SW1953	SLIDE SWITCH	1305301315

OTHERS

CN1901	SOCKET 5-PIN	1245100153
CN1101	PLUG 23-PIN	1245100161
CN1601	PLUG 5-PIN	1245100162
CN1602	PLUG 2-PIN	1245100163
CN1604	PLUG 2-PIN	1245100164
CN1902	SOCKET 24-PIN	1245100165
1901	FLAT CABLE 5-PIN	1245120287
1903	CONNECTOR 2-PIN	1245120288
M901	SPINDLE MOTOR	1246300048
M902	SLIDE MOTOR	1246300049
M903	LOADING MOTOR	1246300050
CN1252	PLUG 2-PIN	1425100204
CN1904	PLUG 4-PIN	1425100223
CN1603	PLUG 2-PIN	1425100236

6. ADJUSTMENT

6.1 ADJUSTING PREPARATIONS

Prepare the following test discs and extension cables and connect according to Fig. 6-1.

● Test Disc

1. High reflective disc (SONY) (For playback) TGYS1
2. Low reflective disc (Recording mini disc) GGF1277
3. Transparent disc for adjusting head GGF1276

● Extension Cable

1. Extension board for servicing GGF1320
2. 2-pin extension connector for servicing GGD1108
3. 6-pin extension connector for servicing GGD1181
4. 5-pin flat cable for servicing GGD1182
5. 28-pin flat cable for servicing GGD1180

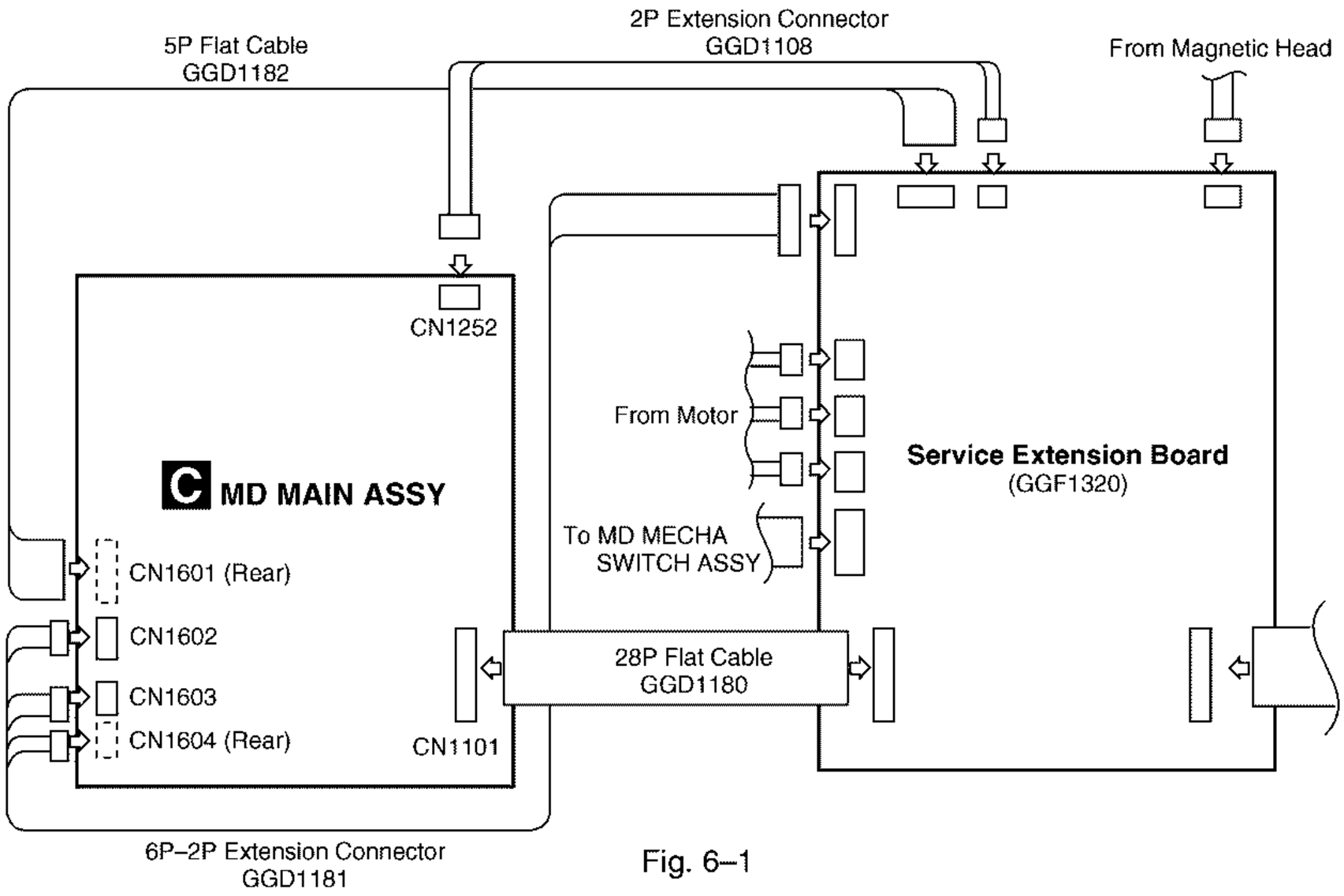
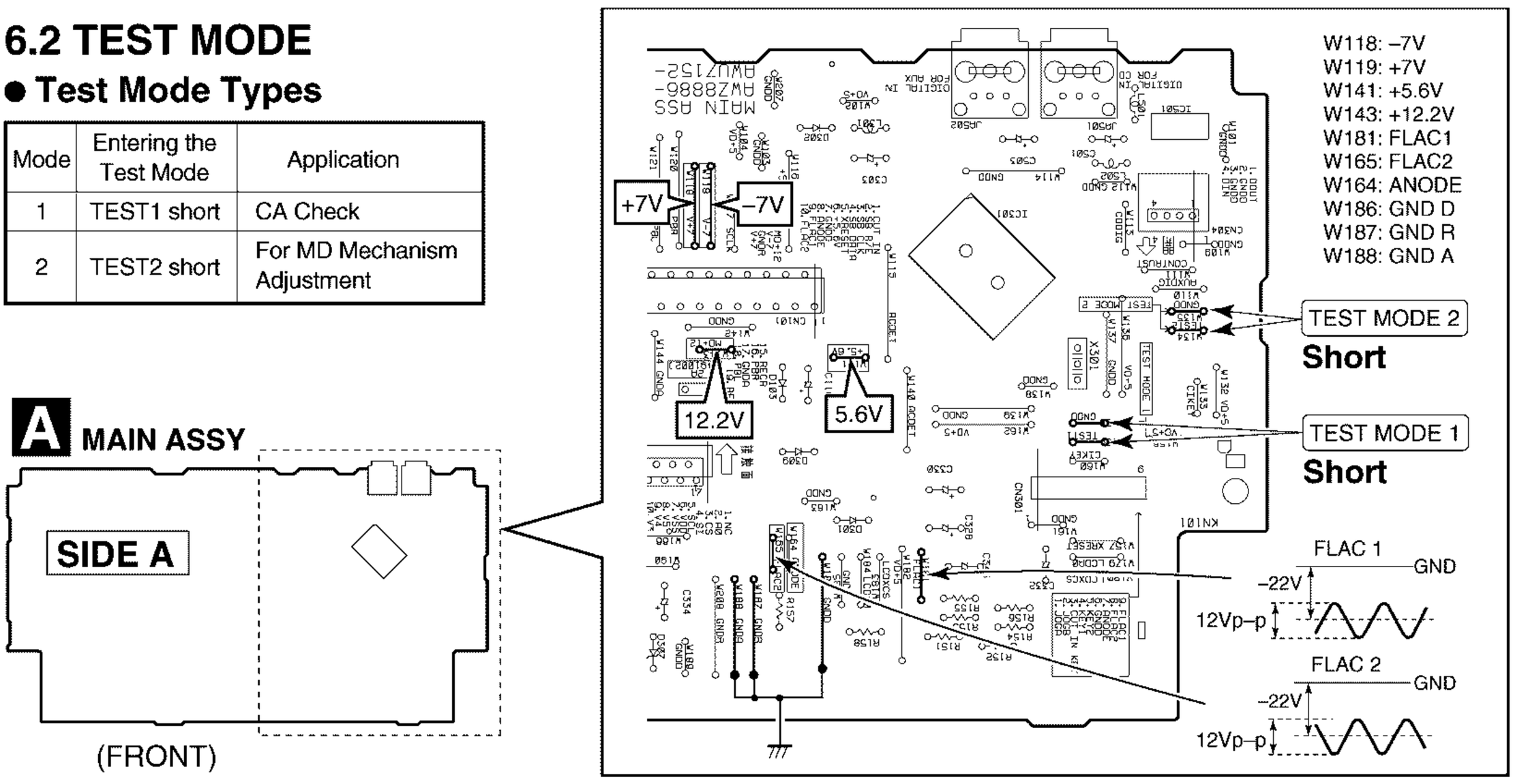


Fig. 6–1

6.2 TEST MODE

● Test Mode Types

Mode	Entering the Test Mode	Application
1	TEST1 short	CA Check
2	TEST2 short	For MD Mechanism Adjustment



Test Mode Short Point

6.2.1 TEST MODE 1

TEST MODE : ON

Short the TEST1 terminal while the power is ON.

Notes)

- In Test Mode the companion may be not only the SX-R9 but also the power jig. When the TEST1 terminal has been shorted without a bus being received even once after RESET, the bus data will be ignored and POWER ON status determined, and the unit will operate independently.
- When the TEST1 terminal is shorted again under these conditions, the normal operation will be restored.

■ Test Mode 1 Menu

● LCD Check

Changes the LCD pattern according to key input and checks for defects in the LCD.

● Auto Recording/Palyback Check

Outputs a request for function changeover to AUX with a bus. REC is executed in analog after 1 second (in some cases there may be a power jig without the SX-R9, so the function changeover to AUX may not be confirmed at this time).
Stops recording after 3 seconds and outputs a request for function changeover to MD with a bus. After 1 second, the recorded portion will be played back for 3 seconds without confirming that the function has switched to MD.

- When the ⏮ key is pressed, digital input is activated and the same operations as above will be performed.
- When the ⏭ key is pressed, the function is switched to CD (1) and only signal ON/OFF will be confirmed digitally.

TEST MODE : CANCEL

Stop the power supply.

■ Single Operation Method

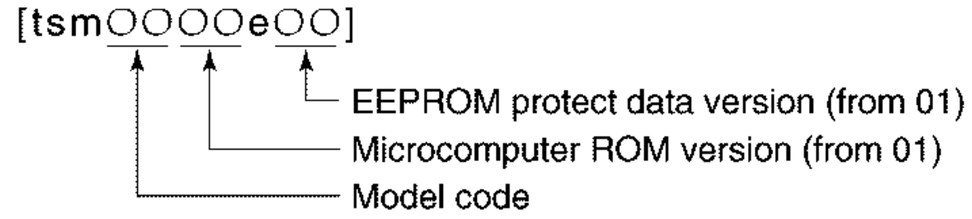
As this product is a system product, operation with assembled components. When single operation can not be avoided, supply power etc. according to the "Test Mode Short Point".

6.2.2 TEST MODE 2

TEST MODE : ON

Short the TEST2 terminal while the power is ON.

Microcomputer Version Display (1 sec)
(1 second when EJECT is completed.)



When this is displayed, it is called "Test Mode Stop status."
In "Test Mode Stop status" and "EJECT status":

- Operation will switch to the mechanism forced EJECT direction while FADE-OUT button is pressed.
- Operation will switch to the mechanism forced LOAD direction while FADE-IN button is pressed.

In each Menu status (See page 30):

- The mechanism slide outer track feed will operate while ⏭ is pressed.
- The mechanism slide inner track feed will operate while ⏮ is pressed.

To move according to the adjusted value set in Test Mode, Press the MD CUT-IN key in Test Mode Stop status. The adjusted value will be written to EEPROM and the AUTO Adjustment Disabled Mode will be engaged.

Notes)

- Canceling the AUTO Adjustment Disabled Mode will stop the power supply. (If a receiver is connected, disconnect the receiver power cord.)
- When a setting is changed in Test Mode and the unit is moved according to that setting, the mechanism may not operate if the set value is faulty. When changing a set value, therefore, make a note of the original value.
- In Test Mode the companion may be not only the SX-R9 but also the power jig. When the TEST2 terminal has been shorted without a bus being received even once after RESET, the bus data will be ignored and POWER ON status determined, and the unit will operate independently.
- When the TEST2 terminal is shorted again under these conditions, the normal operation will be restored.

TEST MODE : CANCEL

Stop the power supply. (If a Receiver SX-R9 is connected, disconnect the Receiver SX-R9 power cord.)

■ Key Allocation (Test Mode 2)

Mode	Meaning and use of commands in Test Mode 2	Remarks
Short	Used when engaging Test Mode. Resets and starts the MD unit and inputs this command.	(Test Mode setting)
MD CUT-IN	Operates at adjusted value set in Test Mode, after writing to EEPROM and executing mechanism positioning.	Restart with this key after quitting Test Mode (Auto Adjustment Disabled Mode setting).
⏏	EJECT command Ejects disc.	
MENU	Test Mode menu scan (1) (Scans menus related to adjustments and EEPROM.)	
SET	Test Mode menu scan (2) (Scans mainly menus related to continuous playback and continuous recording.)	
DISP/CHARA	Test Mode menu scan (3) (Scans INNER Mode, JUMP SELECT, and other menus.)	
●	Test Mode menu reverse scan (Scans all Test Mode menus in reverse order.)	
▶/⏸	Selects or starts execution of a menu.	
■	Stops a test item and moves to the next most important menu selection.	
▶▶I	1. Slide forced scan (FWD direction) 2. JUMP execution (FWD) 3. ADDRESS set value UP 4. Direction designation when setting tracking	Continuously pressed down
I◀◀	1. Slide forced scan (REV direction) 2. JUMP execution (REV) 3. ADDRESS set value DOWN 4. Direction designation when setting tracking	Continuously pressed down
FADE-OUT	1. DISC forced EJECT 2. Set value UP	Continuously pressed down
FADE-IN	1. DISC forced LOAD 2. Set value DOWN	Continuously pressed down
DELETE	1. Laser power changeover in EJECT 2. Display changeover during continuous playback 3. Set value digit changeover when setting ADDRESS	

■ Test Mode 2 Menu

1. AUTO Preliminary Adjustment Mode	● Executes AUTO Preliminary Adjustment. (After adjustment, Grating Adjustment Mode is engaged.) ● Outputs adjusted value.
2. AUTO Adjustment Mode	● Executes AUTO Adjustment. ● Outputs adjusted value. ● Executes continuous playback (error rate display, jump test)
3. RESULT Preliminary Mode	● Displays measured values, set values, and calculated values. ● Changes set value manually (in Servo OFF status).
4. RESULT Mode (this adjustment)	● Displays set value (after calculation). ● Changes set value manually (in Servo OFF status).
5. MANUAL Preliminary Adjustment Mode	● Executes RF side manual adjustment. ● Executes focus/tracking signal ATT manual adjustment. ● Executes focus/tracking signal offset adjustment.
6. MANUAL Adjustment Mode	● Executes focus/tracking signal ATT manual adjustment.
7. EEPROM Setting Mode	● Manually changes all digital servo coefficients, etc. ● Turns each servo ON independently. ● Measures temperature detector terminal voltage and standard value.
8. TEST-PLAY Mode	● Executes continuous playback from designated address. ● Measures C1 error rate and ADIP error rate.
9. TEST-REC Mode	● Executes continuous recording from designated address. ● Changes recording laser output (and also changes servo gain to match laser output).
10. INNER Mode	● Measures point where INNER switch is turned ON.
11. EJECT Mode	● To (EEPROM set) TEMP setting ● To (EEPROM set) CONTROL setting ● Laser power setting (Rec/Play power)

1. AUTO Preliminary Adjustment Mode (Low-Reflectance Disc Only)

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button once.	AUTO Preliminary Adjustment Menu	[_AUT_YOBI_]
Step 3	Press the ▶/❚❚ button once. End of Adjustment	Slide moves to innermost track and AUTO Preliminary Adjustment is engaged. ● During AUTO Adjustment, *** will change as follows. HAo → RFg → SAg → SBg → PTG → PCH → GTG → GCH → RCG → SEG → RFG → SAG → HAO → HEO → TCO → LAO If adjustment is OK, go to step 4. If adjustment is NG, go to step 5.	[*** : _____]
Step 4	Grating adjustment, adjusted value output Press the STOP button.	 Step 2	[_COMPLETE_]
Step 5	Adjusted value output Press the STOP button.	 Step 2 AUTO Preliminary Adjustment Menu	[Can't_ADJ.]

● ***: Adjustment name, □□□□: Address

2. AUTO Adjustment Mode

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 2 times.	AUTO Adjustment Menu	[AUTO_AJST_]
Step 3	Press the ▶/❚❚ button once. End of Adjustment	Slide moves to innermost track and AUTO Adjustment is engaged. ● In the case of a high-reflectance disc, *** will change as follows. PEG → HAG ● In the case of a low-reflectance disc, *** will change as follows. PEG → LAG → GCG → GEG → LAG If adjustment is OK, go to step 4. If adjustment is NG, go to step 7.	[*** : _____]
Step 4	Adjusted value output Press the ▶/❚❚ button. Press the STOP button.	 Step 5 Step 2	[_COMPLETE_]
Step 5	Continuous playback (pit) Continuous playback (groove)		[s □□□□ c OOOO] [a □□□□ c OOOO]
Step 6	Press the DELETE button. Press the STOP button.	Continuous playback (groove) Step 2 AUTO Adjustment Menu	[a □□□□ a OOOO]
Step 7	Adjusted value output Press the STOP button.	 Step 2 AUTO Adjustment Menu	[Can't_ADJ.]

● ***: Adjustment name, OOOO: Measured value, □□□□: Address

3. RESULT Preliminary Mode

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 3 times.	RESULT Preliminary Menu	[_RST_YOBI_]
Step 3	Press the ▶/❚❚ button.	Set value display	[RFG: _____●]
Step 4	Press the MENU button.	Set value display	[RCG: _____●]
Step 5	Press the MENU button.	Set value display	[PTG: _____●]
Step 6	Press the MENU button.	Set value display	[GTG: _____●]
Step 7	Press the MENU button.	Set value display	[PCH: ____●●]
Step 8	Press the MENU button.	Set value display	[GCH: ____●●]
Step 9	Press the MENU button.	Set value display	[SAG: ___●●●]
Step 10	Press the MENU button.	Set value display	[SBG: ___●●●]
Step 11	Press the MENU button.	Set value display	[SEG: ___●●●]

3. RESULT Preliminary Mode

Step No.	Setting Method	Remarks	Display
Step 12	Press the MENU button.	Set value display	[SFG: ___●●●]
Step 13	Press the MENU button.	Measured value display	[HAO: OOO___]
Step 14	Press the MENU button.	Measured value display	[HBO: OOO___]
Step 15	Press the MENU button.	Measured value display	[HEO: OOO___]
Step 16	Press the MENU button.	Measured value display	[HFO: OOO___]
Step 17	Press the MENU button.	Measured value display	[LAO: OOO___]
Step 18	Press the MENU button.	Measured value display	[LBO: OOO___]
Step 19	Press the MENU button.	Measured value display	[LEO: OOO___]
Step 20	Press the MENU button.	Measured value display	[LFO: OOO___]
Step 21	Press the MENU button.	Measured value display	[TCO: _OO___]
Step 22	Press the MENU button.	Adjustment error sequence No. display	[YOB: _□□___]
Step 23	Press the MENU button.	Adjustment status display	[DIF: _□□___]
Step 24	Press the MENU button.	Preliminary adjustment Not yet completed (00)/Completed (4B) display	[ADJ: _□□___]
Step 25	Press the STOP button.	RESULT Preliminary Menu status	[_RST_YOBI_]

- OO: Measured value, ●●: Adjusted value, □□: Other data
- If the REC (●) button is pressed, operation moves in reverse direction.
- If the FADE-OUT button is pressed while a set value is being displayed, the set value will increase and the new set value will be stored in RAM.
- If the FADE-IN button is pressed while a set value is being displayed, the set value will decrease and the new set value will be stored in RAM.
- If the FADE-IN/OUT buttons are pressed and held down, data will change continuously in 100ms cycles.
- Digits increased/decreased with the FADE-IN/OUT buttons can be moved with the DELETE button.

4. RESULT Mode (This Adjustment)

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 4 times.	RESULT Menu	[_RESULT___]
Step 3	Press the ▶/❚❚ button.	Set value display	[HAG: ___●●●]
Step 4	Press the MENU button.	Set value display	[HBG: ___●●●]
Step 5	Press the MENU button.	Set value display	[LAG: ___●●●]
Step 6	Press the MENU button.	Set value display	[LBG: ___●●●]
Step 7	Press the MENU button.	Set value display	[PEG: ___●●●]
Step 8	Press the MENU button.	Set value display	[PFG: ___●●●]
Step 9	Press the MENU button.	Set value display	[GEG: ___●●●]
Step 10	Press the MENU button.	Set value display	[GFG: ___●●●]
Step 11	Press the MENU button.	Set value display	[GCG: ____●●]
Step 12	Press the STOP button.	RESULT Menu status	[_RESULT___]

- ●●: Set value
- If the REC (●) button is pressed, operation moves in reverse direction.
- If the FADE-OUT button is pressed while a set value is being displayed, the set value will increase and the new set value will be stored in RAM.
- If the FADE-IN button is pressed while a set value is being displayed, the set value will decrease and the new set value will be stored in RAM.
- If the FADE-IN/OUT buttons are pressed and held down, data will change continuously in 100ms cycles.
- Digits increased/decreased with the FADE-IN/OUT buttons can be moved with the DELETE button.

6. MANUAL Adjustment Mode

● High-Reflectance Disc

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 6 times.	MANUAL Adjustment Menu	[_MNU_AJST_]
Step 3	Press the ▶/II button.	Initial setting → Temperature Setting Mode	[TMP: _△△___]
Step 4	Press the MENU button.	Laser ON	[LON: _____]
Step 5	Press the MENU button.	Innermost track move → Tracking ATT (signal E) setting	[PEG: △△△OOO]
Step 6	Press the MENU button.	Tracking ATT (signal F) setting	[PFG: △△△OOO]
Step 7	Press the MENU button.	Tracking EFMIO measurement display	[PMI: △△△___]
Step 8	Press the MENU button.	Focus ATT (signal A) setting	[HAG: △△△OOO]
Step 9	Press the MENU button.	Focus ATT (signal B) setting	[HBG: △△△OOO]

- If the STOP (■) button is pressed while the MANUAL Adjustment Menu is being displayed, operation will move to Test Mode STOP status.
- If the REC (●) button is pressed, operation will move back one step at a time.

● Low-Reflectance Disc

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 6 times.	MANUAL Adjustment Menu	[_MNU_AJST_]
Step 3	Press the ▶/II button.	Initial setting → Temperature Setting Mode	[TMP: _△△___]
Step 4	Press the MENU button.	Laser ON	[LON: _____]
Step 5	Press the MENU button.	Innermost track move → Tracking ATT (signal E) setting	[PEG: △△△OOO]
Step 6	Press the MENU button.	Tracking ATT (signal F) setting	[PFG: △△△OOO]
Step 7	Press the MENU button.	Tracking EFMIO measurement display (pit)	[PMI: △△△___]
Step 8	Press the MENU button.	Focus ATT (signal A) setting	[LAg: △△△OOO]
Step 9	Press the MENU button.	Focus ATT (signal B) setting	[LBg: △△△OOO]
Step 10	Press the MENU button.	Outer track move → Track cross setting	[GCG: △△△OOO]
Step 11	Press the MENU button.	Tracking ATT (signal E) setting	[GEG: △△△OOO]
Step 12	Press the MENU button.	Tracking ATT (signal F) setting	[GFG: △△△OOO]
Step 13	Press the MENU button.	Tracking EFMIO measurement display (groove)	[GMI: △△△___]
Step 14	Press the MENU button.	Focus ATT (signal A) setting	[LAG: △△△OOO]
Step 15	Press the MENU button.	Focus ATT (signal B) setting	[LBG: △△△OOO]

- If the STOP (■) button is pressed while the MANUAL Adjustment Menu is being displayed, operation will move to Test Mode STOP status.
- If the REC (●) button is pressed, operation will move back one step at a time, except for the following case:
- Track cross ATT setting (GCG) → Innermost track move → Focus ATT (signal B) setting (LBg)

7. EEPROM Setting Mode

(a) Focus Setting

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 7 times.	EEPROM Setting Menu	[EEPROM_SET]
Step 3	Press the ▶/II button.	Focus Setting Menu	[__Focus___]
Step 4	Press the ▶/II button.	Focus system loop filter gain constant setting	[FG _____ ♦♦]
Step 5	Press the MENU button.	Focus system loop filter f characteristics 1 setting	[FF1_____ ♦♦]
Step 6	Press the MENU button.	Focus system loop filter f characteristics 2 setting	[FF2_____ ♦♦]
Step 7	Press the MENU button.	FZC detection hysterisis level setting a	[FZHLEV__ ♦♦]
Step 8	Press the MENU button.	Comparison level setting (normal) during FOK formation	[FOKLEVn_ ♦♦]
Step 9	Press the MENU button.	Comparison level setting (when Focus ON) during FOK formation	[FOKLEVf_ ♦♦]

(a) Focus Setting

Step No.	Setting Method	Remarks	Display
Step 10	Press the MENU button.	LPF coefficient measurement (normal) during FOK formation	[FOKLPFn_ ♦♦]
Step 11	Press the MENU button.	LPF coefficient measurement (when Focus ON) during FOK formation	[FOKLPFf_ ♦♦]
Step 12	Press the MENU button.	Wait setting for Auto Focus lead in	[WAITf___ ♦♦]

- ♦♦: Set value
- If the REC (●) button is pressed, operation moves in reverse direction.
- If the FADE-OUT button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN/OUT buttons are pressed and held down, data will change continuously in 100ms cycles.

(b) Spin Setting

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 7 times.	EEPROM Setting Menu	[EEPROM_SET]
Step 3	Press the ▶/❚❚ button.	Focus Setting Menu	[__Focus___]
Step 4	Press the MENU button.	Spin Setting Menu	[_Spindle___]
Step 5	Press the ▶/❚❚ button.	Spin system loop filter gain constant setting (until tracking servo is ON)	[SPG _____ ♦♦]
Step 6	Press the MENU button.	Spin system loop filter gain constant setting (subsequent to tracking servo ON, inner)	[SPG_in__ ♦♦]
Step 7	Press the MENU button.	Spin system loop filter gain constant setting (subsequent to tracking servo is ON, middle)	[SPG_mid_ ♦♦]
Step 8	Press the MENU button.	Spin system loop filter gain constant setting (subsequent to tracking servo is ON, outer)	[SPG_out_ ♦♦]
Step 9	Press the MENU button.	Spin system loop filter f characteristics 1 setting	[SP1 _____ ♦♦]
Step 10	Press the MENU button.	Spin system loop filter f characteristics 2 setting	[SP2 _____ ♦♦]
Step 11	Press the MENU button.	Spin system loop filter f characteristics 3 setting	[SP3 _____ ♦♦]
Step 12	Press the MENU button.	Spin system loop filter f characteristics 4 setting	[SP4 _____ ♦♦]
Step 13	Press the MENU button.	Spin system loop filter f characteristics 5 setting	[SP5 _____ ♦♦]
Step 14	Press the MENU button.	Spin drive output limiter setting	[SPDLIM__ ♦♦]

- ♦♦: Set value
- If the REC (●) button is pressed, operation moves in reverse direction.
- If the FADE-OUT button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN/OUT buttons are pressed and held down, data will change continuously in 100ms cycles.

(c) Tracking Setting

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 7 times.	EEPROM Setting Menu	[EEPROM_SET]
Step 3	Press the ▶/❚❚ button.	Focus Setting Menu	[__Focus___]
Step 4	Press the MENU button 2 times.	Tracking Setting Menu	[_Tracking_]
Step 5	Press the ▶/❚❚ button.	Tracking system loop filter gain constant setting	[TG _____ ♦♦]
Step 6	Press the MENU button.	Tracking system loop filter f characteristics 1 setting	[TF1 _____ ♦♦]
Step 7	Press the MENU button.	Tracking system loop filter f characteristics 2 setting	[TF2 _____ ♦♦]
Step 8	Press the MENU button.	Tracking system servo mode 4 setting	[SVCNT4__ ♦♦]

(c) Tracking Setting

Step No.	Setting Method	Remarks	Display
Step 9	Press the MENU button.	Tracking deceleration pulse level setting (for 1 jump)	[TRBLVo__ ♦♦]
Step 10	Press the MENU button.	Tracking deceleration pulse level setting (for 10 jumps)	[TRBLVt__ ♦♦]
Step 11	Press the MENU button.	Tracking kick pulse level setting (for 1 jump)	[TRKLVo__ ♦♦]
Step 12	Press the MENU button.	Tracking kick pulse level setting (for 10 jumps)	[TRKLVt__ ♦♦]
Step 13	Press the MENU button.	Tracking drive pulse width setting (for 1 jump)	[TDPWo___ ♦♦]
Step 14	Press the MENU button.	Tracking drive pulse width setting (for 10 jumps)	[TDPW+___ ♦♦]
Step 15	Press the MENU button.	Tracking slide Stop time setting (for 1 jump)	[SLCTo___ ♦♦]
Step 16	Press the MENU button.	Tracking slide Stop time setting (for 10 jumps)	[SLCTt___ ♦♦]
Step 17	Press the MENU button.	Tracking slide Stop time setting (Move)	[SLCTm___ ♦♦]
Step 18	Press the MENU button.	TCRS comparison level 1 for high-reflectance disc	[TCRSC1P_ ♦♦]
Step 19	Press the MENU button.	Comparison level during COUT formation (during playback)	[COTLVp__ ♦♦]
Step 20	Press the MENU button.	Comparison level during COUT formation (during recording)	[COTLVr__ ♦♦]
Step 21	Press the MENU button.	Wait time setting for Auto Move	[WAITm___ ♦♦]

- ♦♦: Set value
- If the REC (●) button is pressed, operation moves in reverse direction.
- If the FADE-OUT button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN/OUT buttons are pressed and held down, data will change continuously in 100ms cycles.

(d) Slide Setting

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 7 times.	EEPROM Setting Menu	[EEPROM_SET]
Step 3	Press the ▶/II button.	Focus Setting Menu	[__Focus___]
Step 4	Press the MENU button 3 times.	Slide Setting Menu	[___Sled___]
Step 5	Press the ▶/II button.	Slide system loop filter gain constant setting	[SLG_____ ♦♦]
Step 6	Press the MENU button.	Slide system loop filter f characteristics 2 setting	[SL2 _____ ♦♦]
Step 7	Press the MENU button.	Slide output limiter setting	[SLDLIM__ ♦♦]
Step 8	Press the MENU button.	Slide servo output dead zone level setting	[SLDLEV__ ♦♦]
Step 9	Press the MENU button.	Slide kick pulse level setting (during forced Move)	[SLKLVk__ ♦♦]
Step 10	Press the MENU button.	Slide kick pulse level setting (for 10 auxiliary jumps)	[SLKLVt__ ♦♦]
Step 11	Press the MENU button.	Slide kick pulse level setting (during Move)	[SLKLVm__ ♦♦]

- ♦♦: Set value
- If the REC (●) button is pressed, operation moves in reverse direction.
- If the FADE-OUT button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN/OUT buttons are pressed and held down, data will change continuously in 100ms cycles.

(e) TEMP Setting

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 7 times.	EEPROM Setting Menu	[EEPROM_SET]
Step 3	Press the ▶/❚❚ button.	Focus Setting Menu	[__Focus___]
Step 4	Press the MENU button 4 times.	TEMP Setting Menu	[___Temp___]
Step 5	Press the ▶/❚❚ button.	TEMP standard value setting	[TEMP_OO_♦♦]

Step No.	Setting Method	Remarks	Display
Step 1	EJECT status (or No Mechanism status)		[__EJECT___]
Step 2	Press the SET button.	TEMP standard value setting	[TEMP_OO_♦♦]

- ♦♦: Set value, OO: Measured value
- If the FADE-OUT button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN/OUT buttons are pressed and held down, data will change continuously in 100ms cycles.

Measured Temperature Values Correction Table

Ambient temperature	Correction value
–0.9 °C to +2.7 °C	–06 H
+2.7 °C to +6.3 °C	–05 H
+6.3 °C to +10.0 °C	–04 H
+10.0 °C to +14.5 °C	–03 H
+14.5 °C to +18.2 °C	–02 H
+18.2 °C to +22.3 °C	–01 H
+22.3 °C to +26.3 °C	±0 H
+26.3 °C to +30.3 °C	+01 H
+30.3 °C to +34.6 °C	+02 H
+34.6 °C to +39.0 °C	+03 H
+39.0 °C to +42.8 °C	+04 H

EEPROM recording value = microcomputer measured value + correction value

* EEPROM recording value
Predicted value when measured with microcomputer when temperature is +25 °C.
* Microcomputer measured value
Predicted value when measured with microcomputer at a certain temperature.
* Correction value
Correction value for converting to +25 °C measured value (see Table at left).

Temperature Code Confirmation

After AUTO Adjustment has been completed, the temperature code will be read. If it is within the ranges below, it is OK.

Ambient temperature	Temperature Code
–18.2 °C to +30.3 °C	06
+6.3 °C to +18.2 °C	07

(f) CONTROL Setting

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the MENU button 7 times.	EEPROM Setting Menu	[EEPROM_SET]
Step 3	Press the ▶/❚❚ button.	Focus Setting Menu	[__Focus___]
Step 4	Press the MENU button 5 times.	CONTROL Setting Menu	[_Control__]
Step 5	Press the ▶/❚❚ button.	CONTROL 1 Setting	[CONTRL1_♦♦]
Step 6	Press the MENU button.	CONTROL 2 Setting	[CONTRL2_♦♦]
Step 7	Press the MENU button.	Spin kick level setting during Move	[SPKLEVm_♦♦]
Step 8	Press the MENU button.	Readjustment interval (minutes) setting	[ADJTTM_♦♦]
Step 9	Press the MENU button.	Equalizer coefficient A, D (high reflectance) setting	[HDEQAD_♦♦]
Step 10	Press the MENU button.	Equalizer coefficient A, D (low reflectance) setting	[LDEQAD_♦♦]
Step 11	Press the MENU button.	Equalizer coefficient A, D (low reflectance groove) setting	[GDEQAD_♦♦]
Step 12	Press the MENU button.	Equalizer coefficient B, C (high reflectance) setting	[HDEQBC_♦♦]
Step 13	Press the MENU button.	Equalizer coefficient B, C (low reflectance pit) setting	[LDEQBC_♦♦]

(e) CONTROL Setting

Step No.	Setting Method	Remarks	Display
Step 14	Press the MENU button.	Equalizer coefficient B, C (low reflectance groove) setting	[GDEQBC_ ♦♦]
Step 15	Press the MENU button.	Auto level slicer gain (high reflectance) setting	[HALSG___ ♦♦]
Step 16	Press the MENU button.	Auto level slicer gain (low reflectance pit) setting	[LALSG___ ♦♦]
Step 17	Press the MENU button.	Auto level slicer gain (low reflectance groove) setting	[GALSG___ ♦♦]
Step 18	Press the MENU button.	Auto level slicer offset (high reflectance) setting	[HALSOFS_ ♦♦]
Step 19	Press the MENU button.	Auto level slicer offset (low reflectance pit) setting	[LALSOFS_ ♦♦]
Step 20	Press the MENU button.	Auto level slicer offset (low reflectance groove) setting	[GALSOFS_ ♦♦]

Step No.	Setting Method	Remarks	Display
Step 1	EJECT status (or No Mechanism status)		[__EJECT___]
Step 2	Press the DISP/CHARA button.	CONTROL 1 setting	[CONTRL1_ ♦♦]
Step 3	Press the MENU button.	CONTROL 2 setting	[CONTRL2_ ♦♦]

- ♦♦: Set value
- If the FADE-OUT button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN button is pressed while a setting item is being displayed, the set value will increase and the new set value will be set in LSI.
- If the FADE-IN/OUT buttons are pressed and held down, data will change continuously in 100ms cycles.
- CONTROL 1
  Pit 7: High-frequency weight ON/OFF during recording (0: OFF, 1: ON)
  Pits 6 – 4: Play start SD number (30 – 100 sectors; 10-sector steps)
  Pit 2 – 0: High-speed jump overrun amount (384 – 830 jumps; 64-jump steps)
- CONTROL 2
  Pit 4 – 0: EEPROM version (a –)

8. TEST-PLAY Mode

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the SET button.	TEST-PLAY Menu	[TEST_PLAY_]
Step 3	Press the DELITE button. Press the ▶/II button.	ADRES setting (displays standard address initial setting) Sets Search output to "H" during Search operation and returns to "L" at start of playback.	[ADRES _0050]
Step 4	Continuous playback (pit) Continuous playback (groove)	(Address + C1 error display) (Address + C1 error display)	[s □□□□ c OOOO] [a □□□□ c OOOO]
Step 5	Press the DELETE button. Continuous playback (groove)	(Address + ADIP error display)	[a □□□□ a OOOO]
Step 6	Press the STOP button.	TEST-PLAY Menu	[TEST_PLAY_]

- □□□□: Address, OOOO: Error rate, ▲▲▲: Number of Jumps
- If the STOP (■) button is pressed while the TEST-PLAY Menu is displayed, operation moves to Test Mode STOP status.
- If the ▶/II button is pressed while the TEST-PLAY Menu is displayed, continuous playback will commence from the pickup point at that time.
- Each time the SET button is pressed in Address Setting Mode, the address will change as follows:
  0050 → 03C0 → 0700 → 08A0 → 0050 → .....
- Each time the DELETE button is pressed in Address Setting Mode, the digits will change as follows with the ▶▶I / I◀◀ buttons.
  0050 → 0050 → 0050 → 0050 → .....
- In Address Setting Mode, the designated address digits can be changed +01H / –01H with the ▶▶I / I◀◀ and DELETE buttons (0 – F).
  If the ▶▶I / I◀◀ buttons are pressed and held down, the data will change in 100ms cycles.
- If the DISP/CHARA button is pressed in Continuous Play Mode, the number of Jumps will change as follows:
  1 Jump → 10 Jumps → 400 Jumps → 1 Jump → .....
  After the number of Jumps is displayed for 1 second, the Address display will be restored [▲▲▲TR_JUMP]
- If the ▶▶I / I◀◀ buttons are pressed in Continuous Play Mode, the designated number of Jumps will be executed in FWD/REV directions.
  If the ▶▶I / I◀◀ buttons are pressed and held down, the data will change in 100ms cycles.

- Each time the DELETE button is pressed in Continuous Play Mode, the display will change as follows:
  Pit part: Continuous playback (SUBQ address display + C1 error display) is unchanged. [s □□□□ c OOOO]
  Groove part: Continuous playback (ADIP address display + C1 error display) [a □□□□ c OOOO]
  ⬇
  Continuous playback (ADIP address display + ADIP error display) [a □□□□ a OOOO]
  ⬇
  Continuous playback (ADIP address display + C1 error display) [a □□□□ c OOOO]
  ⬇

9. TEST-REC Mode

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the SET button 2 times.	TEST-REC Menu	[TEST_REC__]
Step 3	Press the DELITE button.	ADRES setting (displays standard address initial setting)	[a0050_pwVV]
Step 4	Press the ▶/❚❚ button.	Sets Search output to "H" during Search operation and returns to "L" at start of playback. Continuous recording	[a □□□□ pwVV]
Step 5	Press the STOP button.	TEST-REC Menu	[TEST_REC__]

- □□□□: Address, VV: Laser power code
- If the STOP (■) button is pressed while the TEST-REC Menu is displayed, operation moves to Test Mode STOP status.
- If the ▶/❚❚ button is pressed while the TEST-REC Menu is displayed, continuous playback will commence from the pickup point at that time.
- Each time the SET button is pressed in Address Setting Mode, the address will change as follows:
  0050 → 03C0 → 0700 → 08A0 → 0050 → .....
- Each time the DELETE button is pressed in Address Setting Mode, the digits will change as follows with the ▶▶❙ / ❙◀◀ buttons.
  0050 → 0050 → 0050 → 0050 → .....
- In Address Setting Mode, the designated address digits can be changed +01H / –01H with the ▶▶❙ / ❙◀◀ buttons (0 - F).
  If the ▶▶❙ / ❙◀◀ buttons are pressed and held down, the data will change in 100ms cycles.
- If the Test Record Mode and Continuous Recording Mode FADE-IN/OUT buttons are pressed, the laser recording power will change. (And the laser gain will change to match the recording power.)

10. INNER Mode

Step No.	Setting Method	Remarks	Display
Step 1	Test mode STOP state		[tsmOOOOeOO]
Step 2	Press the DISP/CHARA button.	INNER Menu	[__INNER___]
Step 3	Press the ▶/❚❚ button.	INNER switch position measurement (SUBQ address and C1 error are both displayed.)	[s □□□□ c OOOO]
Step 4	Press the STOP button.	INNER Menu	[__INNER___]

- □□□□: Address
- Press the STOP (■) button in the INNER Menu and move to Test Mode STOP status.

11. EJECT Mode

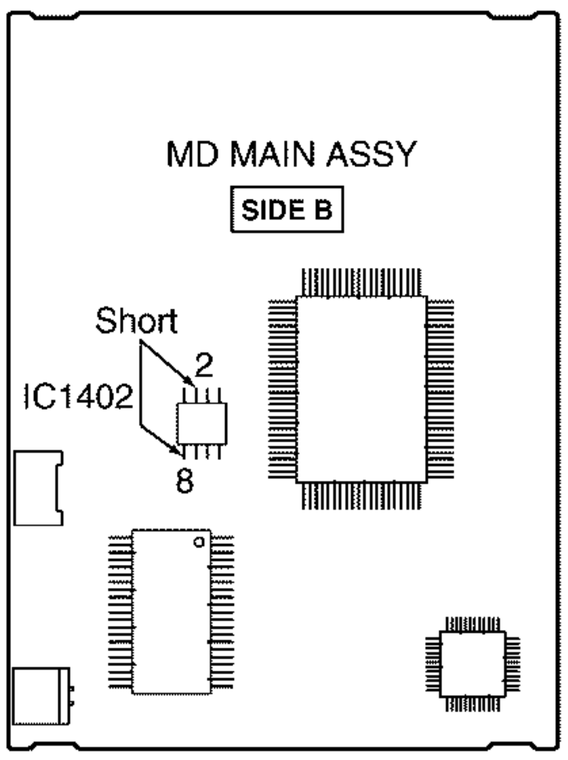
Step No.	Setting Method	Remarks	Display
Step 1	Test Mode EJECT status		[__EJECT___]
Step 2	Press the DELETE button.	Maximum power output status	[xpw_____]
Step 3	Press the DELETE button.	Recording power output status	[rpw_____]
Step 4	Press the DELETE button.	Playback power output status	[ppw_____]
Step 5	Press the SET button.	To EEPROM setting TEMP setting (Refer to EEPROM setting TEMP setting.)	
Step 6	Press the DISP/CHARA button.	To EEPROM setting CONTROL setting (Refer to EEPROM setting CONTROL setting.)	

6.2.3 MD Mechanism Test Mode

When the MD mechanism, pickup, and MD MAIN assy are newly assembled, engage the MD mechanism Test Mode and execute AUTO Preliminary Adjustment and AUTO Adjustment according to the following procedure.

(1) Short the IC1402 (EEPROM) 8 pin (PROTECT) and 2 pin (Vcc).
(2) Engage the MD mechanism Test Mode and execute AUTO Preliminary Adjustment and AUTO Adjustment.
(3) Press the MD CUT-IN key and quit Test Mode. (EEPROM will then be written to.)
(4) Cancel the shorting of IC1402 8 pin and 2 pin.

Carry out the above procedure and stop the power supply. (If a receiver is connected, disconnect the receiver power cord.)



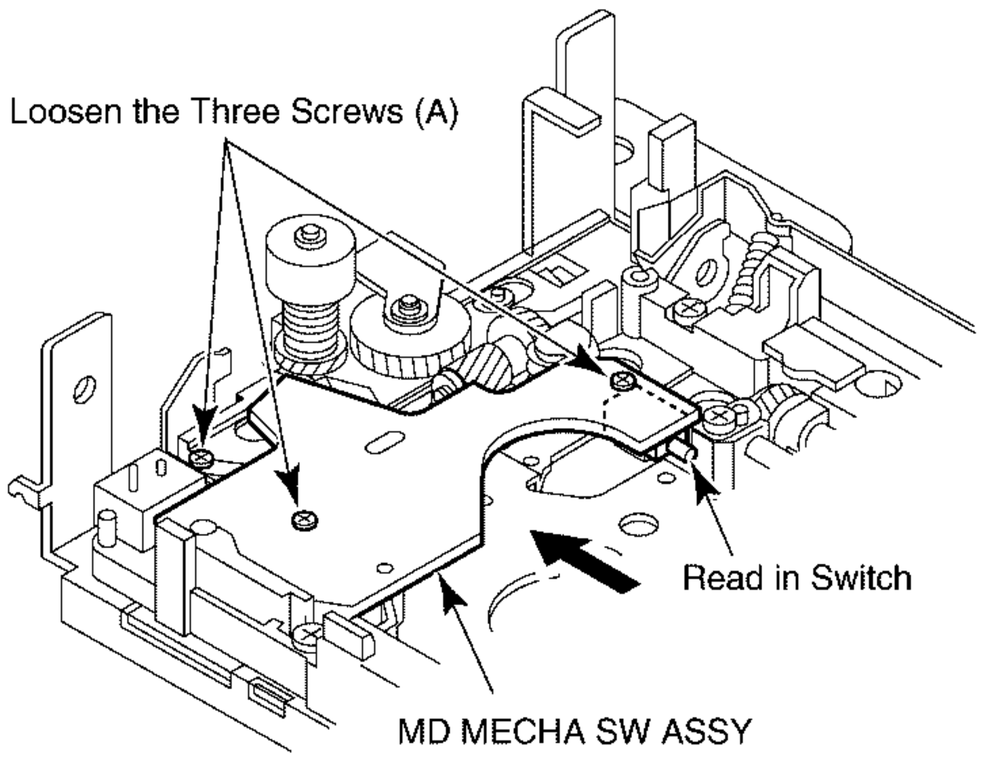
MD MAIN ASSY Short Point

6.3 READ-IN SWITCH POSITION MEASUREMENT MODE

NOTE) Adjust the read-in switch position to 5F FF85 to FFD2.

1. Loosen the three screws (A) securing the MD MECHA SW ASSY.
2. While pressing the MD MECHA SW ASSY in the + direction, tighten the screws, and measure the read in switch position again. After adjusting the position, secure the three screws (A).

NOTE) Lock the two screws on the PCB with silicon bond after completing adjustment.

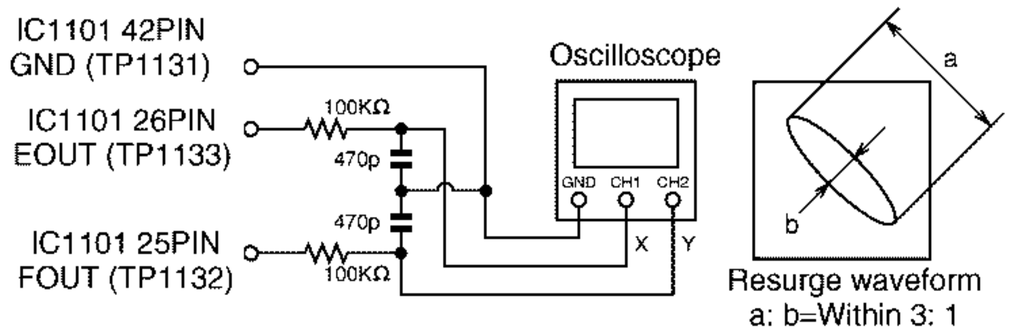


■ Loading Motor Forced Rotation

When Test Mode STOP status and EJECT status are displayed, the loading motor can be forcefully rotated by pressing the FADE-IN/OUT buttons.

6.4 MECHANISM ADJUSTMENT

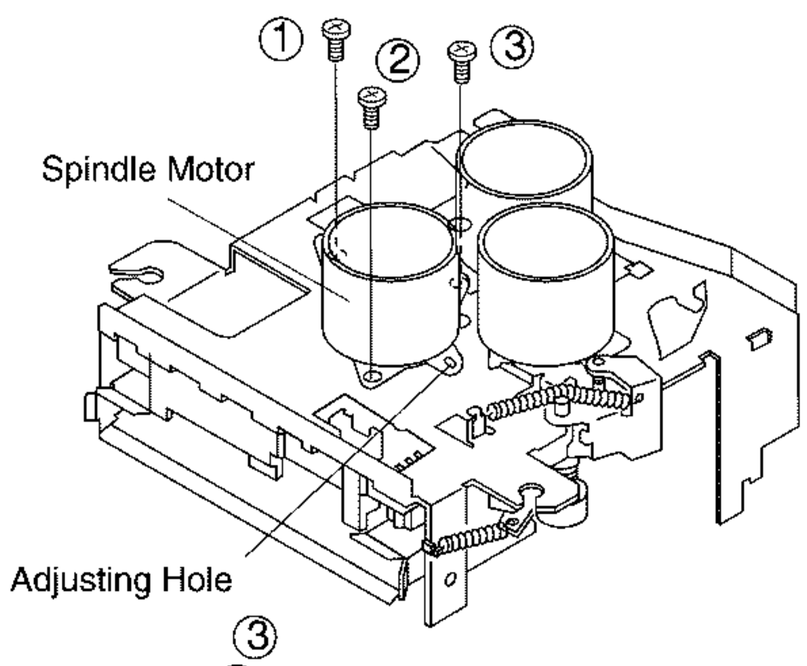
6.4.1 Detecting the Optical Pickup Grating

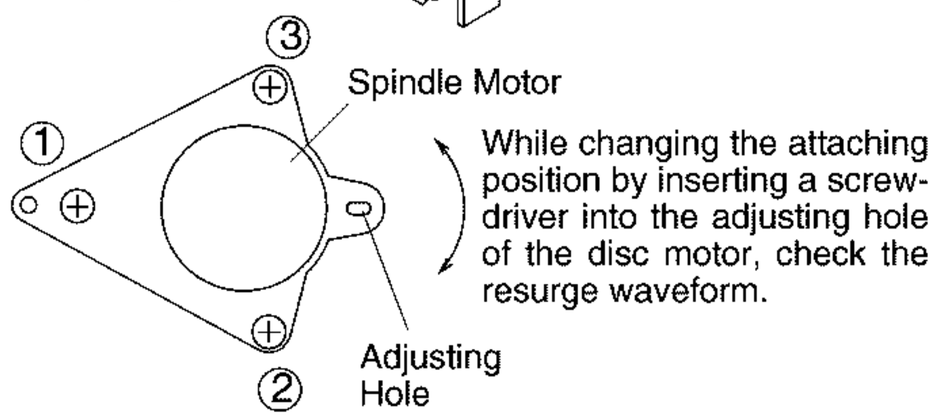


Measuring the Optical Pickup Grating Deviation

Using a high reflective MD disc, perform automatic adjustment in the AUTO test mode (COMPLETE is displayed), and adjust the EOUT: FOUT resurge waveform (x-y).

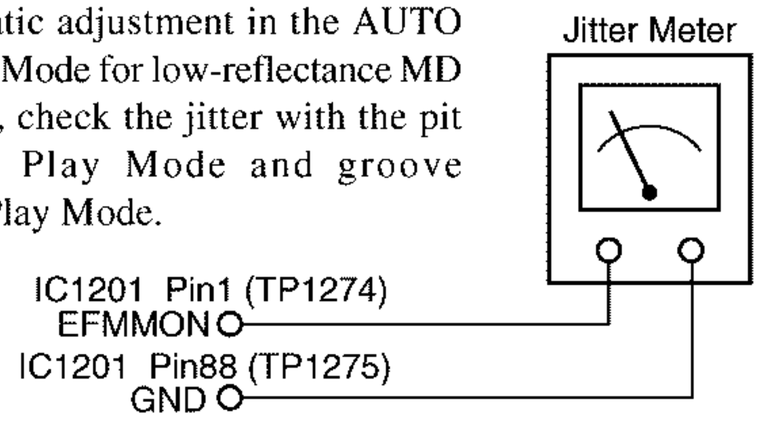
(1) Desolder the two points of the disc motor board, solder the lead wire to the motor terminal and board temporarily as shown in the figure, loosen the three screws of the motor slightly, and while looking at the resurge waveform, adjust it.
(2) After adjusting, tighten the screws in the order of ①, ②, and ③.




③
Spindle Motor
①
While changing the attaching position by inserting a screw-driver into the adjusting hole of the disc motor, check the resurge waveform.
Adjusting Hole
②

6.4.2 Checking Jitter

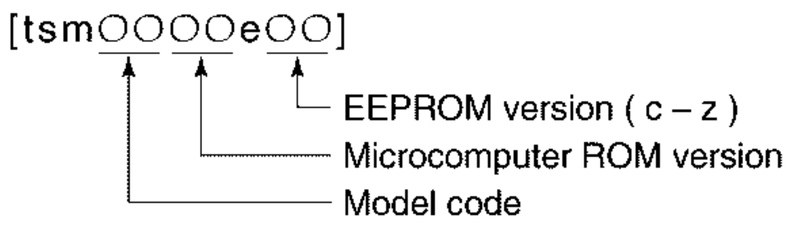
After automatic adjustment in the AUTO Mode of Test Mode for low-reflectance MD is completed, check the jitter with the pit Continuous Play Mode and groove Continuous Play Mode.



6.5 EEPROM (IC1402) WRITING PROCEDURE

1. Procedure for replacing EEPROM and writing microcomputer initial settings to EEPROM

(1) Replace EEPROM.
(2) Short the IC1402 (EEPROM) 8 pin (PROTECT) and 2 pin (Vcc).
(3) Refer to the latest "EEPROM Content Table."
(4) Short TEST MODE2 while the power is ON and engage the Test Mode 2.
(5) Version display



(6) Press the MENU button 7 times. [EEPROM_SET]
(7) Perform the operation shown in the "EEPROM Setting Mode Transition Diagram," compare the "EEPROM Content Table" and the display, and set the "EEPROM Content Table" with the FADE-OUT button and the FADE-IN button.
(8) Set the temperature standard value. (See "Temperature Standard Value Setting Method.")
(9) Set all settings the same as those in the "EEPROM Content Table."
(10) Execute AUTO Preliminary Adjustment and AUTO Adjustment.
(11) Cancel the IC1402 8 pin and 2 pin short.
(12) Press the MD CUT-IN button and write to EEPROM.

2. Temperature Standard Value Setting Method (Must be set with room temperature of 21°C – 29°C.)

(1) Test Mode STOP status ..... [tsmOOOOeOO]
(2) Because of the ambient temperature, apply a temperature correction in accordance with the following table.

Ambient temperature	Correction value
–0.9 °C to +2.7 °C	–06 H
+2.7 °C to +6.3 °C	–05 H
+6.3 °C to +10.0 °C	–04 H
+10.0 °C to +14.5 °C	–03 H
+14.5 °C to +18.2 °C	–02 H
+18.2 °C to +22.3 °C	–01 H
+22.3 °C to +26.3 °C	±0 H
+26.3 °C to +30.3 °C	+01 H
+30.3 °C to +34.6 °C	+02 H
+34.6 °C to +39.0 °C	+03 H
+39.0 °C to +42.8 °C	+04 H

Example)
When the measured temperature is 73H and the ambient temperature 22°C,
Temperature set value =
73H - 01H = 72H.
When there is a discrepancy between two measured temperature values, set the lower value. (If the measured values are 73H and 72H, for example, use 72H.)

(3) Press the MENU button 7 times ..... [EEPROM_SET]
(4) Press the ▶/II button once ..... [__Focus___]
(5) Press the MENU button 4 times ..... [___Temp___]
(6) Press the ▶/II button ..... [TEMP_OO_♦♦]
OO: Measured value, ♦♦: Set value
(7) Set the temperature set value to the value determined above, using the FADE-IN/OUT buttons.
(8) Press the ▶/II button ..... [___Temp___]

■ EEPROM Content Table

Focus Settings

Item display		Set value
FG	OO	97H
FF1	OO	9EH
FF2	OO	E0H
FZHLEV	OO	EDH
FOKLEVn	OO	08H
FOKLEVf	OO	88H
FOKLPFn	OO	00H
FOKLPFf	OO	88H
WAITf	OO	90H

Spin Settings

Item display		Set value
SPG	OO	20H
SPG-in	OO	B8H
SPG-mid	OO	76H
SPG-out	OO	50H
SP1	OO	10H
SP2	OO	87H
SP3	OO	E3H
SP4	OO	E3H
SP5	OO	10H
SPDLIM	OO	78H

Tracking Settings

Item display		Set value
TG	OO	45H
TF1	OO	70H
TF2	OO	E0H
SVCNT4	OO	01H
TRBLVo	OO	53H
TRBLVt	OO	60H
TRKLVo	OO	4CH
TRKLVt	OO	38H
TDPWo	OO	89H
TDPWt	OO	1AH
SLCTo	OO	00H
SLCTt	OO	40H
SLCTm	OO	53H
TCRSCIP	OO	16H
COTLVP	OO	14H
COTLVr	OO	28H
WAITm	OO	FFH

Slide Settings

Item display		Set value
SLG	OO	35H
SL2	OO	27H
SLDLIM	OO	65H
SLDLEV	OO	16H
SLKLVk	OO	55H
SLKLVt	OO	3AH
SLKLVm	OO	55H

Control Settings

Item display		Set value
CONTRL1	OO	80H
CONTRL2	OO	01H
SPKLEVm	OO	26H
ADJTTM	OO	14H
HDEQAD	OO	90H
LDEQAD	OO	8FH
GDEQAD	OO	91H
MDEQBC	OO	90H
LDEQBC	OO	8FH
GDEQBC	OO	8AH
HALSG	OO	21H
LALSG	OO	21H
GALSG	OO	21H
HALSOFS	OO	FEH
LALSOFS	OO	00H
GALSOFS	OO	00H

■ EEPROM Setting Mode Transition Diagram

7. GENERAL INFORMATION

7.1 PARTS

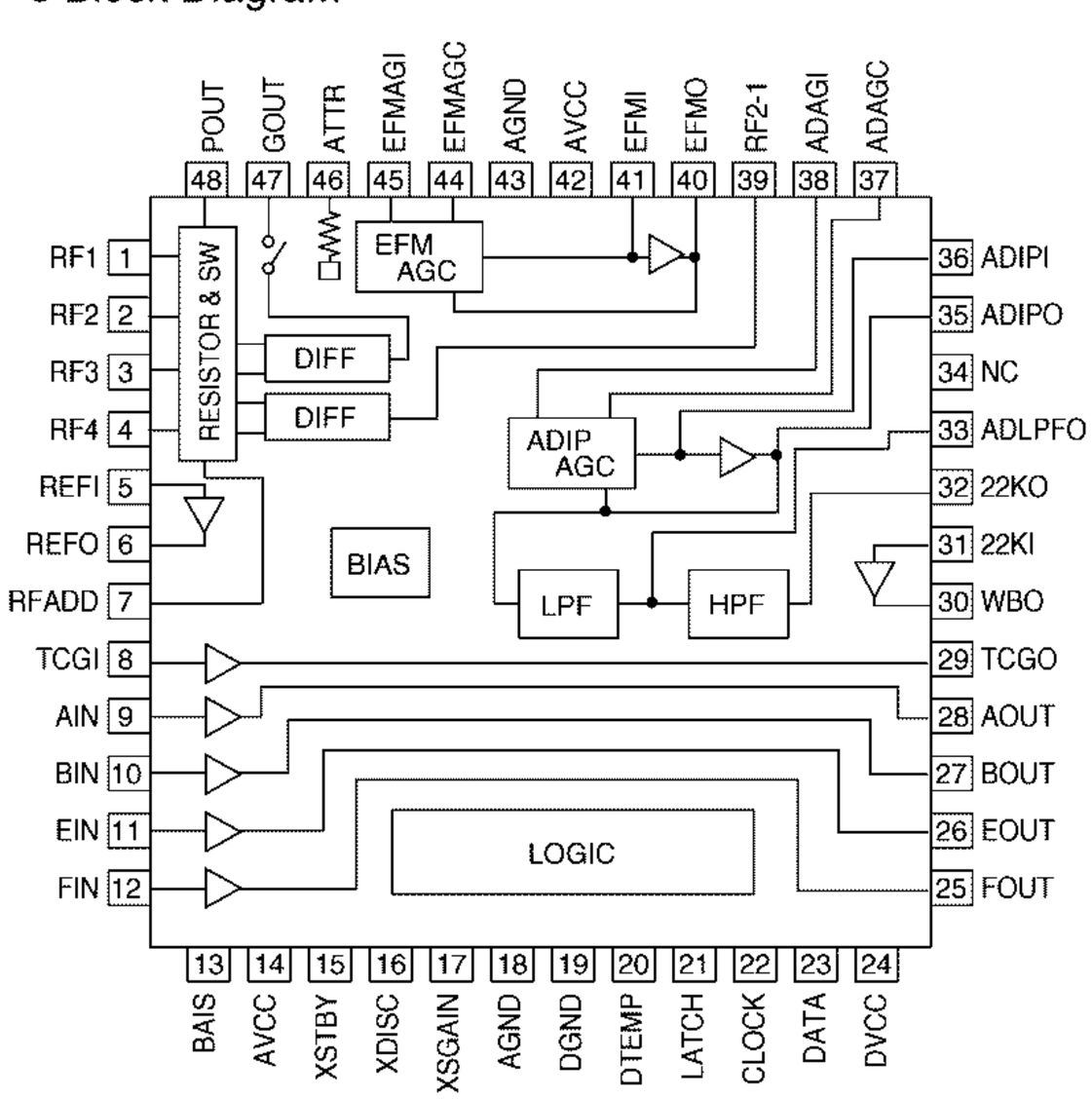
7.1.1 IC

- The information shown in the list is basic information and may not correspond exactly to that shown in the schematic diagrams.

■ 1245730345 (IR3R55) [IC1101: PWB–A (MD MAIN ASSY)]

● RF Signal Processor

● Block Diagram



● Pin Function

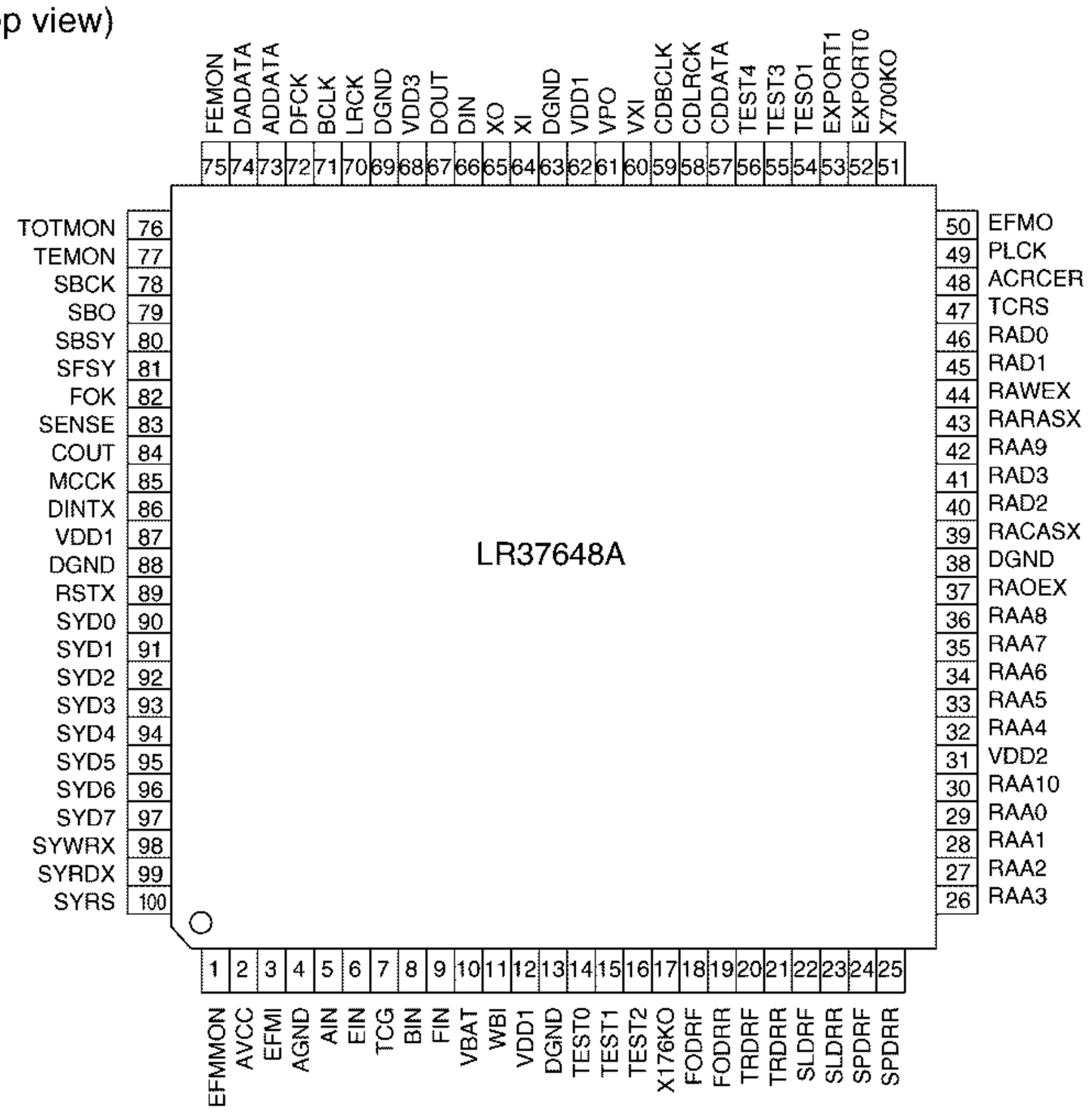
No.	Name	Description
1	RF1	Inputs RF signal input terminal 1 pickup RF signal output.
2	RF2	Inputs RF signal input terminal 2 pickup RF signal output.
3	RF3	Inputs RF signal input terminal 3 pickup RF signal output.
4	RF4	Inputs RF signal input terminal 4 pickup RF signal output.
5	REFI	Standard voltage amp input terminal
6	REFO	Standard voltage amp output terminal
7	RFADD	RF1 - 4 resistance addition output terminal
8	TCGI	Track cross detection signal amp input terminal during groove input
9	AIN	Servo-use signal amp (Focus servo system) inversion input terminal
10	BIN	Servo-use signal amp (Focus servo system) inversion input terminal
11	EIN	Servo-use signal amp (Tracking servo system) inversion input terminal
12	FIN	Servo-use signal amp (Tracking servo system) inversion input terminal
13	BIAS	Bias input terminal
14	AVCC	Analog power terminal
15*	VSTBY	Logic signal output terminal (outputs STBY signal inversion signal)
16*	XDISC	Logic signal output terminal (outputs DISC signal inversion signal)
17*	XSGAIN	Logic signal output terminal (outputs SGAIN signal inversion signal)
18	AGND	Analog part GND terminal
19	DGND	Digital part GND terminal
20	DTEMP	Tip temperature detection terminal
21	LATCH	Latch signal input terminal
22	CLOCK	Clock signal input terminal
23	DATA	Serial data input terminal
24	DVCC	Digital part power terminal
25	FOUT	Servo-use signal amp (Tracking servo system) output terminal
26	EOUT	Servo-use signal amp (Tracking servo system) output terminal
27	BOUT	Servo-use signal amp (Focus servo system) output terminal
28	AOUT	Servo-use signal amp (Focus servo system) output terminal
29	TCGO	Track cross detection signal amp output terminal during groove output
30	WBO	Comparator output terminal for ADIP signal 2-value conversion
31	22KI	Comparator input terminal for ADIP signal 2-value conversion
32	22KO	ADIP signal HPF amp output terminal
33	ADLPFO	ADIP signal LPF amp output terminal
34*	NC	NC
35	ADIPO	ADIP signal preamp output terminal
36	ADIPI	ADIP signal AGC amp output terminal
37	ADAGC	Smoothing capacitor connection terminal for ADIP signal AGC
38	ADAGI	ADIP signal AGC amp input terminal
39	RF2-1	RF1, RF2 differential signal
40	EFMO	RF signal preamp output terminal
41*	EFMI	RF signal AGC amp output terminal
42	AVCC	Analog part power terminal
43	AGND	Analog part GND terminal
44	EFMAGC	Smoothing capacitor connection terminal for EFM signal AGC
45	EFMAGI	EFM signal AGC amp input terminal
46*	ATTR	Terminal for attenuating 47, 48 pin output signal
47	GOUT	Outputs RF1 + RF2 + RF3 – RF3 – RF4 signal during groove output
48	POUT	RF1 – 4 resistance addition output during pit output

Terminals denoted with an asterisk (*) are (Open) terminals that are not externally connected.

■ 1245730418 (LR37648A) [IC1201: PWB–A (MD MAIN ASSY)]

● Encode/Decode/Atrac

● Pin Assignment (Top view)



● Pin Function

No.	Name	I/O	Description
1*	EFMMON	O	EFM monitor output
2	AVCC	–	Analog power supply
3	EFMI	I	EFM signal input from RF amp
4	AGND	–	Analog GND
5	AIN	I	Focus error signal A
6	EIN	I	Tracking error signal E
7	TCG	I	Track cross signal
8	BIN	I	Focus error signal B
9	FIN	I	Tracking error signal F
10*	VBAT	I	Power-supply voltage detection signal for constant-voltage servo
11	WBI	I	ADIP wobble signal
12	VDD1	–	Digital power supply
13	DGND	–	Digital GND
14	TEST0	I	Test-use input; normally connected to GND when used.
15	TEST1	I	
16	TEST2	I	Test-use input; Encoder/Servo Mode and ATRAC Mode changeover

No.	Name	I/O	Description
17	X176KO	O	Clock output; f = 176.4kHz (4fs)
18	FODRF	O	Focus servo forward output; PWM
19	FODRR	O	Focus servo reverse output; PWM
20	TRDRF	O	Tracking servo forward output; PWM
21	TRDRR	O	Tracking servo reverse output; PWM
22	SLDRF	O	Slide servo forward output; PWM
23	SLDRR	O	Slide servo reverse output; PWM
24	SPDRF	O	Spindle servo forward output or spindle servo output; PWM
25	SPDRR	O	Spindle servo reverse output or spindle rotation forward/reverse changeover
26	RAA3	O	Address output to external D-RAM; ADR3
27	RAA2	O	Address output to external D-RAM; ADR2
28	RAA1	O	Address output to external D-RAM; ADR1
29	RAA0	O	Address output to external D-RAM; ADR0 (LSB)
30*	RAA10	O	Address output to external D-RAM; ADR10 (MSB)
31	VDD2	–	Power supply for DRAM interface

No.	Name	I/O	Description
32 I 36	RAA4 I RAA8	O	Address output to external D-RAM; ADR4 I Address output to external D-RAM; ADR8
37	RAOEX	O	Data output enable signal output to external D-RAM
38	DGND	–	Digital GND
39	RACASX	O	Column address strobe signal output to external D-RAM
40	RAD2	I/O	External D–RAM and data input/output; D2
41	RAD3	I/O	External D-RAM and data input/output; D3 (MSB)
42	RAA9	O	Address output to external D-RAM; ADR9
43	RARASX	O	Low address strobe signal output to external D-RAM
44	RAWEX	O	Data write enable signal output to external D-RAM
45	RAD1	I/O	External D-RAM and data input/output; D1
46	RAD0	I/O	External D-RAM and data input/output; D0 (LSB)
47*	TCRS	O	Track cross signal
48*	ACRCER	O	ADIP CRC error flag monitor output
49*	PLCK	O	EFM PLL clock output during Play
50	EFM0	O	EFM signal output during Record; C1F (C1 error flag) monitor output during Play.
51*	X700KO	O	Clock output; f = 705.6kHz; clock is not output when RSTX = 0.
52*	EXPORT0	O	Microcomputer extension output port 0
53*	EXPORT1	O	Microcomputer extension output port 1
54	TESO1	O	Microcomputer extension output port 2 during PLLLR changeover
55	TEST3	I/O	Microcomputer extension output port 3 during PLLOSC changeover
56	TEST4	I/O	Microcomputer extension output port 4 during EXTCLK changeover
57	CDDATA	I/O	CD data input for high-speed dubbing; microcomputer extension port 5 during changeover
58	CDLRCK	I/O	CD LR clock input for high-speed dubbing; microcomputer extension port 6 during changeover
59	CDBCLK	I/O	CD bit clock input for high-speed dubbing; microcomputer extension port 7 during changeover
60	VXI	I	PLL clock input for varying pitch
61*	VPO	O	PLL phase error input for varying pitch
62	VDD1	–	Digital power supply
63	DGND	–	Digital GND
64	XI	I	Oscillation circuit input; 33.8688MHz
65	XO	O	

No.	Name	I/O	Description
66	DIN	I	Digital input signal
67	DOUT	O	Digital output signal
68	VDD3	–	Power supply for internal PLL
69	DGND	–	Digital GND
70	LRCK	O	Music data Lch/Rch changeover output
71	BCLK	O	Music data shift lock
72	DFCK	O	Clock for AD/DA converter digital filter; 256fs
73	ADDATA	I	Audio data input
74	DADATA	O	Audio data output
75*	FEMON	O	Focus error signal monitor output
76*	TOTMON	O	Total signal monitor output
77*	TEMON	O	Tracking error signal monitor output
78*	SBCK	I	DIN sub code readout clock; EIAJ CP-309 format
79*	SBO	O	DIN sub code serial data; EIAJ CP-309 format
80*	SBSY	O	DIN sub code block synchronization signal; EIAJ CP-309 format
81*	SFSY	O	DIN sub code frame synchronization signal; EIAJ CP-309 format
82	FOK	O	Focus OK detection signal; "0": Focus OK
83	SENSE	O	Servo status detection signal; "1": Auto Move/ Auto Jump/Auto Focus lead-in in progress
84	COUT	O	Track cross signal output
85	MCCK	O	Clock output for microcomputer; clock is output even when RSTX = 0.
86	DINTX	O	Interrupt Request output signal for system computer interface
87	VDD1	–	Digital power supply
88	DGND	–	Digital GND
89	RSTX	I	Tip reset input; reset with L (NOTE)
90	SYD0	I/O	System computer interface data bus terminal; (LSB)
91 I 96	SYD1 I SYD6	I/O	System computer interface data bus terminal
97	SYD7	I/O	System computer interface data bus terminal; (MSB)
98	SYWRX	I	System computer interface register write pulse input
99	SYRDX	I	System computer interface register read pulse input
100	SYRS	I	System computer interface register select input

Terminals denoted with an asterisk (*) are (Open) terminals that are not externally connected.

NOTE) Set RSTX to "L" when the power is being turned ON or after it has been turned ON.

■ 1245730417 (IX0232) [IC1401: PWB–A (MD MAIN ASSY)]

● MD System Micro-computer

● Pin Function

No.	Name	I/O	Description
1*	P96/ANEX1	O	Input/output port P96
2*	P95/ANEX0	O	Input/output port P95
3	P94/DA1	O	LDVAR (laser power adjustment output)
4*	P93/DA0	O	ADJS (for automatic adjustment step check)
5*	P92/TB2IN	O	Input/output port P92
6	P91/TB1IN	I	LD SW CK input (interrupt input when there is only one unit)
7	P90/TB0IN	I	$\overline{ERR}$ input (monitor PLL UNLOCK)
8	BYTE	I	GND
9	CNVss	I	GND
10*	P87/XCIN	O	ST-ID output
11*	P86/XOUT	O	MD Search output
12	$\overline{RESET}$	I	RESET input
13*	XOUT	-	Clock output
14	Vss	-	GND
15	XIN	I	EXTAL(8.4672MHz)
16	Vcc	-	+3.15V
17	P85/$\overline{NMI}$	I	Input/output P85
18	P84/$\overline{INT2}$	I	DINT (interrupt input from MD/LSI)
19	P83/$\overline{INT1}$	I	DSENSE (servo sense input from MD/LSI)
20	P82/$\overline{INT0}$	I	ST-ID input (MD-ON)
21	P81/TA4IN	I	CD Search input (Synchro REC Pause input)
22	P80/TA4OUT	O	MD RSW output
23*	P77/TA3IN	I	FSW1 (SW power supply frequency changeover)
24	P76TA3OUT	O	Variable pitch correspondence Yes (H) / NO (L)
25	P75/TA2IN	I	P-DOWN (power failure detection)
26	P74/TA2OUT	O	HDON (magnetic head current ON/OFF output)
27	P73/TA1IN	O	LD+ (loading motor + control output)
28	P72/TA1OUT	O	LD- (loading motor - control output)
29	P71/TA0IN	I	CIN (track count signal output)
30	P70/TA0OUT	I	INN SW (inner SW detection input)
31	P67/TXD1	O	R-DATA
32	P66/RXD1	O	R-LATCH
33	P65/CLK1	O	R-CLK
34	P64/$\overline{CTS1}$/$\overline{RTS1}$	O	DSTB (system computer communication enable or in progress)
35	P63/TXD0	O	MD DATA (MD data output)
36	P62/RXD0	I	K DATA (system computer data input)

No.	Name	I/O	Description
37	P61/CLK0	I	DSCK (system computer communication clock input)
38	P60/$\overline{CTS0}$/$\overline{RTS0}$	I	$\overline{4M}$/16M DRAM select input
39	P57/$\overline{RDY}$/CLKOUT	O	R/$\overline{P}$ output (REC/PLAY changeover)
40	P56/ALE	I	FOK (Focus servo status monitor input)
41*	P55/$\overline{HOLD}$	O	Input/output port P55
42	P54/$\overline{HLDA}$	O	S2 output
43	P53/BCLK	O	S1 output
44	P52/$\overline{RD}$	O	SYRS (MD-LSI) register select signal output
45	P51/$\overline{WRH}$/$\overline{BHE}$	O	SYRD (MD-LSI) read signal output
46	P50/$\overline{WRL}$/$\overline{WR}$	O	SYWR(MD-LSI) write signal output
47 ⋮ 50	P47/$\overline{CS3}$ ⋮ P44/$\overline{CS0}$	I/O	SYS D7 (data bus 7) ⋮ SYS D4 (data bus 4)
51 ⋮ 54	P43/A19 ⋮ P40/A16	I/O	SYS D3 (data bus 3) ⋮ SYS D0 (data bus 0)
55* ⋮ 57*	P37/A15 ⋮ P35/A13	O	Input/output P37 ⋮ Input/output P35
58	P34/A12	O	EEPRO (E2PROM protect cancel)
59	P33/A11	O	EPCS (E2PROM tip selector output)
60	P32/A10	I/O	EEPD (E2PROM serial data output)
61	P31/A9	O	EEPK (E2PROM serial clock output)
62	Vcc	I	+3.15V
63*	P30/A8	O	Input/output port P30
64	Vss	-	GND
65	P27/A7	O	L3 DATA (soft serial communication, 2 mode enable, LSB first)
66	P26/A6	O	L3 MODE (soft serial communication, 2 mode enable, LSB first)
67	P25/A5	O	L3 CLK (soft serial communication, 2 mode enable, LSB first)
68*	P24/A4	O	Input/output port P24
69*	P23/A3	O	Input/output port P23
70	P22/A2	O	PCNT0 output
71*	P21/A1	O	Input/output port
72	P20/A0	O	LDON output (H: ON)
73	P17/D15	O	ANLPTR output
74*	P16/D14	O	ADPON output (for CK)
75*	P15/D13	O	DAPON output (for CK)
76*	P14/D12	O	DFS0 output
77*	P13/D11	O	DFS1 output

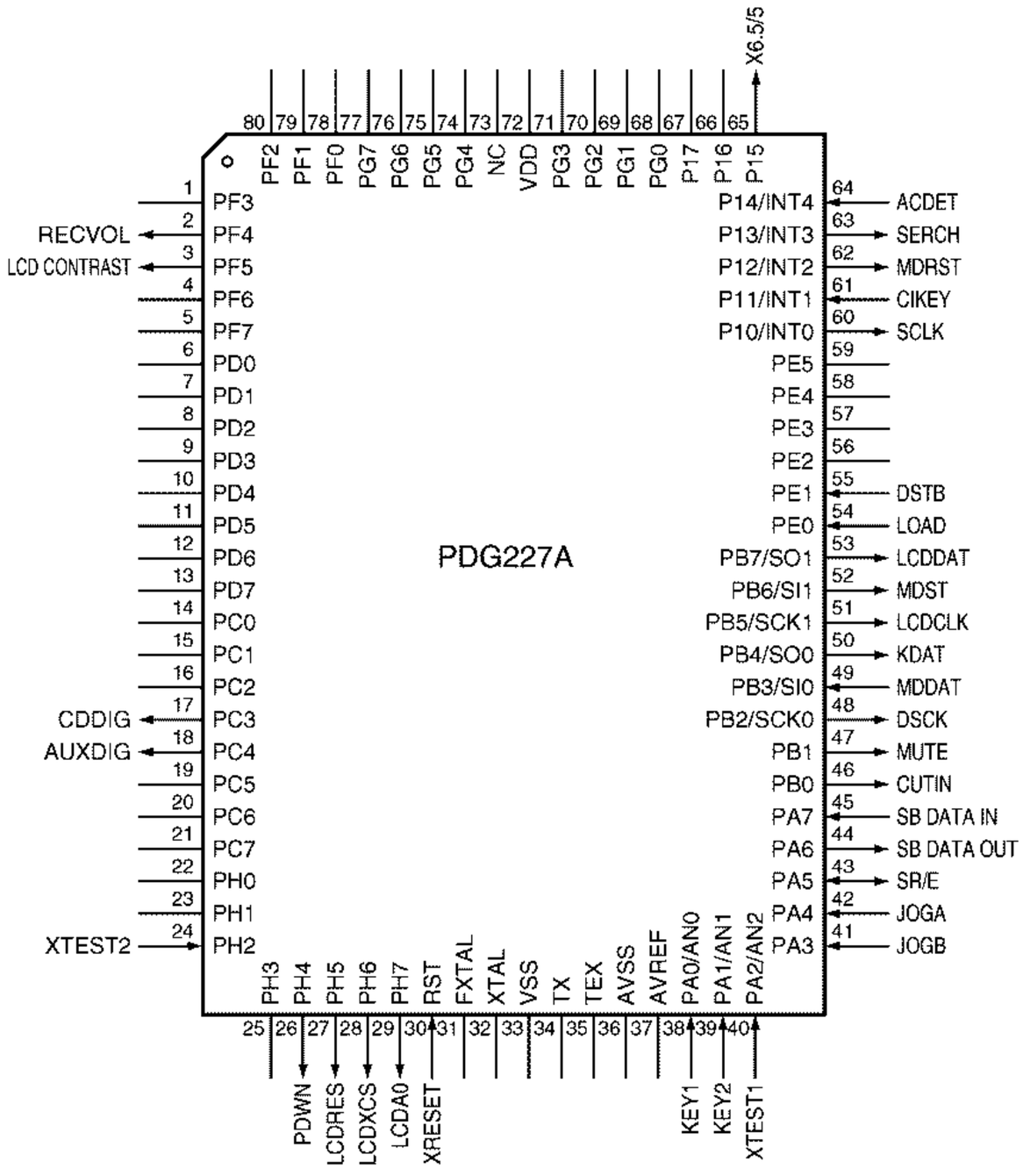
No.	Name	I/O	Description
78*	P12/D10	O	DIG EX output (for CK)
79*	P11/D9	O	DIG CD output (for CK)
80	P10/D8	O	XRST (system reset output)
81*	P07/D7	O	ADMUTE output (for CK)
82*	P06/D6	O	EMPHA output (for CK)
83*	P05/D5	O	DAMUTE output (for CK)
84*	P04/D4	O	MUTE output
85*	P03/D3	O	DOUTM output (for CK)
86	P02/D2	I	TEST2 (special mode selection 2)
87	P01/D1	I	TEST1 (special mode selection 1)
88	P00/D0	I	TEST0 (special mode selection 0)
89	P107/AN7/$\overline{KI3}$	I	AVCK3 (special mode monitor input)
90	P106/AN6/$\overline{KI2}$	I	AVCK2 (AD/DA part 3.1V monitor input)
91	P105/AN5/$\overline{KI1}$	I	AVCK1 (DOUT part 5V monitor input)
92	P104/AN4/$\overline{KI0}$	I	DTEMP (temperature detection input)
93	P103/AN3	I	MNF (disc type/REC input)
94	P102/AN2	I	TEST K1 (test key input 1)
95	P101/AN1	I	TEST K2 (test key input 2)
96	AVss	-	GND
97	P100/AN0	I	HNF (mechanism position/HEAD position)
98	VREF	-	+3.15V
99	AVcc	-	+3.15V
100	P97/$\overline{ADTRG}$	I	Input/output port

Terminals denoted with an asterisk (*) are (Open) terminals that are not externally connected.

■ PDG227A (IC301: MAIN ASSY)

● System Micro-computer

● Pin Assignment (Top view)



● Pin Function

No.	Symbol	Name	I/O	Description
1	PF3/SDA1	NC	I/O	Not used
2	PF4/PWM0	RECVOL	O	REC VOL adjustment (PWM)
3	PF5/PWM1	LCD CONT	O	LCD contrast adjustment (PWM)
4	PF6/TxD	NC	O	Not used
5	PF7	NC	I	Not used
6 I 13	PD0 I PD7	NC	I/O	Not used
14 I 16	PC0 I PC2	NC	I/O	Not used
17	PC3	CDDIG	I/O	Digital-IN CD
18	PC4	AUXDIG	I/O	Digital-IN AUX
19 I 21	PC5 I PC7	NC	I/O	Not used
22	PH0	NC	I/O	Not used
23	PH1			
24	PH2	XTEST2	I/O	Test terminal 2
25	PH3	NC	I/O	Not used
26	PH4	PDWN	I/O	Power failure notification to MD unit
27	PH5	LCDRES	I/O	LCD reset
28	PH6	LCDXCS	I/O	LCD chip select

PDG227A

No.	Symbol	Name	I/O	Description
29	PH7	LCDA0	I/O	LCD A0
30	RST	XRESET	I	RESET terminal
31	EXTAL	—	I	8.38MHz oscillator connection
32	XTAL	—	O	
33	Vss	Vss	–	GND terminal
34	TX	NC	O	Not used
35	TEX	—	I	(GND connection)
36	AVss	—	–	A/D converter GND
37	AVref	—	I	A/D converter standard voltage
38	PA0/AN0	KEY1	I/O	KEY1 input (A/D conversion)
39	PA1/AN1	KEY2	I/O	KEY2 input (A/D conversion)
40	PA2/AN2	XTEST1	I/O	Test terminal 1
41	PA3/AN3	JOGB	I/O	JOB B input
42	PA4/AN4	JOGA	I/O	JOB A input
43	PA5/AN5	SR/E	I/O	System bus request
44	PA6/AN6	SB DATA OUT	I/O	System bus data output
45	PA7/AN7	SB DATA IN	I/O	System bus data input
46	PB0/CINT	CUTIN	I/O	Cut-in rehearsal Start request
47	PB1/CS0	MUTE	I/O	Line mute
48	PB2/CSK0	DSCK	I/O	MD unit communication clock
49	PB3/SI0	MDDAT	I/O	MD unit → system computer data
50	PB4/SO0	KDAT	I/O	System computer → MD unit data
51	PB5/SCK1	LCDCLK	I/O	LCD clock
52	PB6/SI1	MDST	I/O	MD unit ON

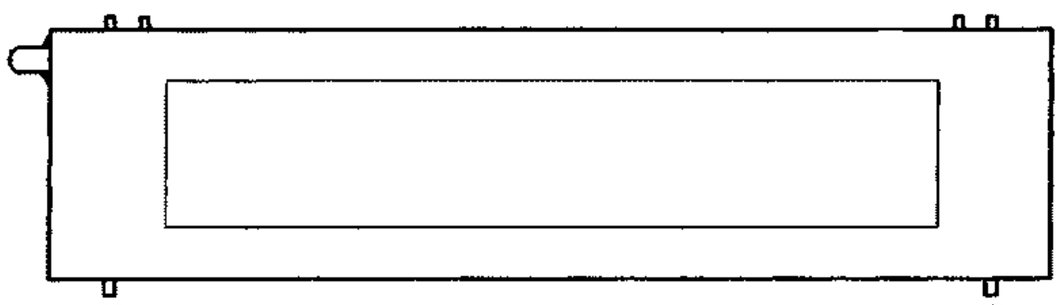
No.	Symbol	Name	I/O	Description
53	PB7/SO1	LCDDAT	I/O	LCD data
54	PE0/EC0	LOAD	I	Load-In detection
55	PE1/EC1	DSTB	I	MD unit communication strobe
56	PE2/RMC	NC	I	Not used
57	PE3/NMI	NC	I	
58	PE4	NC	O	
59	PE5/TO	NC	O	
60	PI0/INT0	SCLK	I/O	System bus clock
61	PI1/INT1	CIKEY	I/O	Cut-In key detection
62	PI2/INT2	MDRST	I/O	MD unit reset
63	PI3/INT3	SERCH	I/O	Cut-in rehearsal Pause request
64	PI4/INT4	ACDET	I/O	Power failure detection
65	PI5/SCK2	X6.5/5	I/O	Load-In voltage changeover
66	PI6/SI2	NC	I/O	Not used
67	PI7/SO2	NC		
68 I 71	PG0 I PG3	NC	I/O	Not used
72	Vdd	—	–	Positive power supply terminal
73	NC	—	–	(VDD connection)
74 I 77	PG4 I PG7	NC	I/O	Not used
78	PF0/SCL0	NC	I/O	Not used
79	PF1/SCL1			
80	PF2/SDA0			

7.1.2 DISPLAY

■ AAV7048 (V401: FRONT ASSY)

● FL Tube

● Pin Assignment



NOTE 1) F1,F2 --- Filament
2) NP ------- No pin
3) NC ------- No connection
4) DL ------- Datum Line

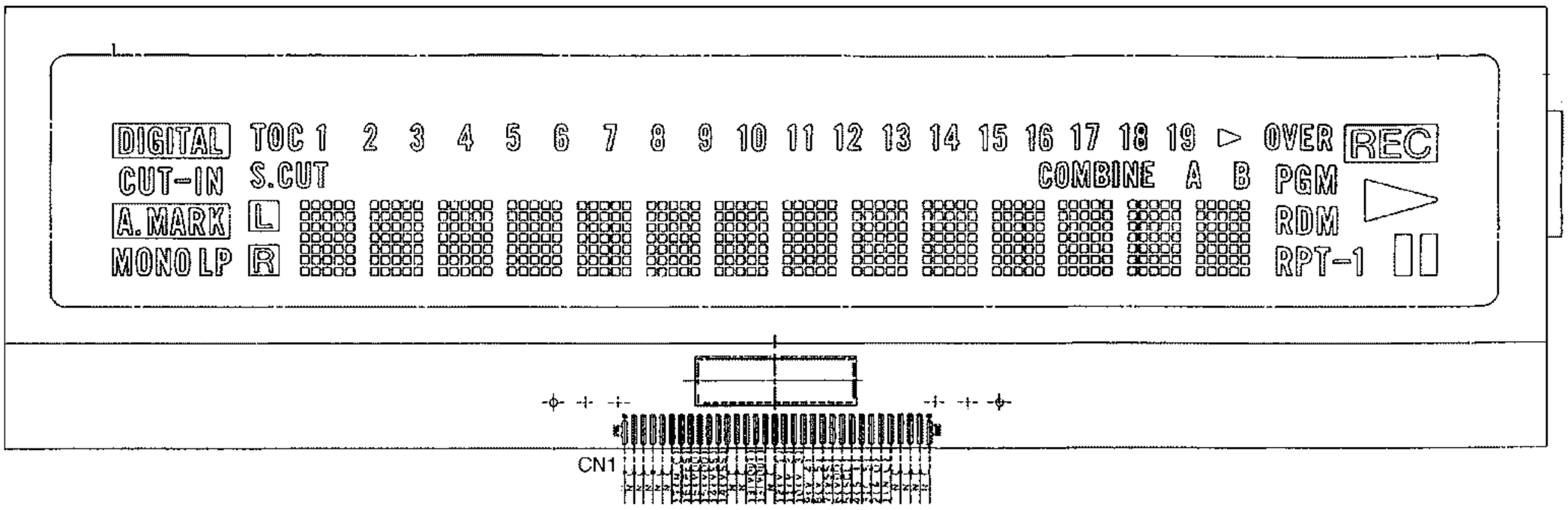
● Pin Connection

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
CONNECTION	F1	F1	NP	NP	S1	NC	NC	NC	NC	NC	NC	NC	NC	NC	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	F2	F2

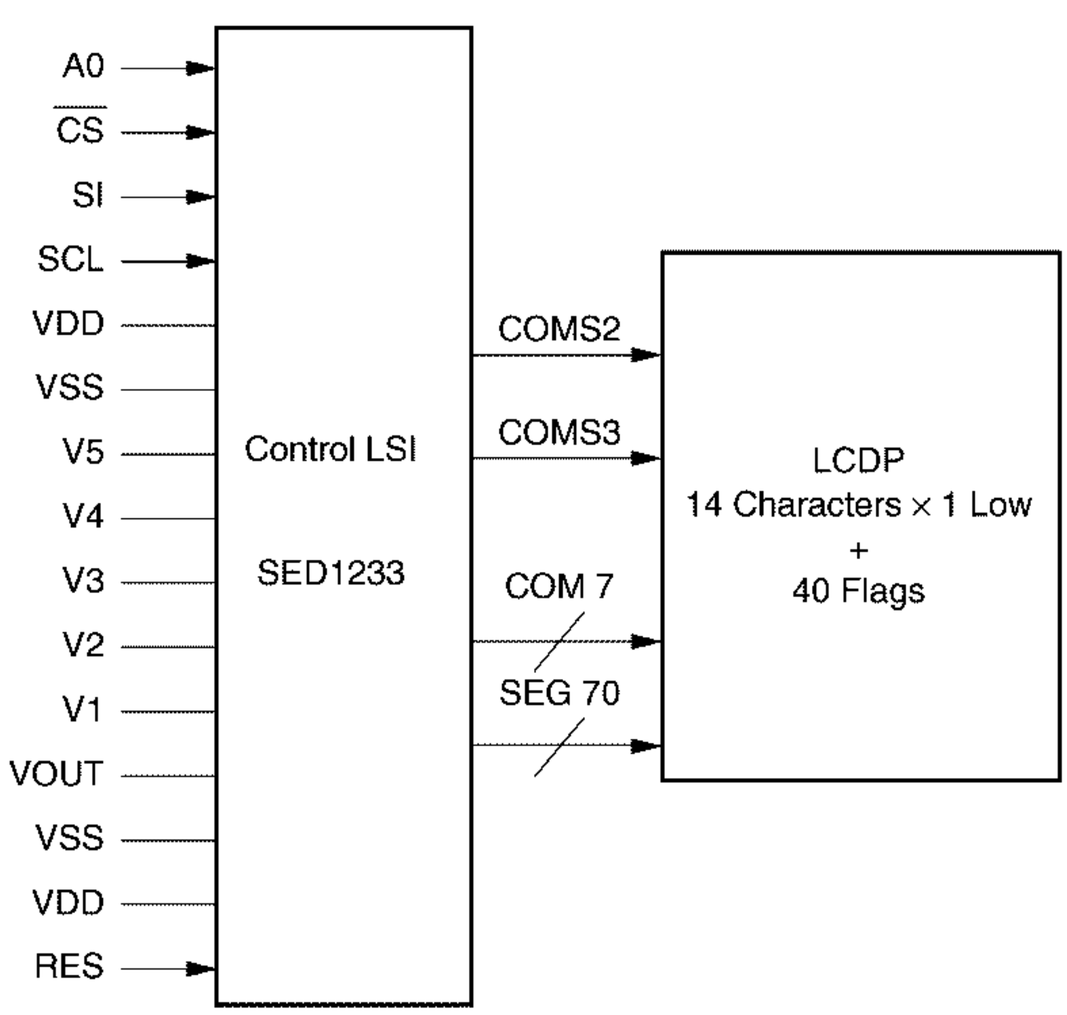
■ AAV7050 (LCD DISPLAY)

● LCD Assy

● Pin Assignment



● Block Diagram



● Pin Function

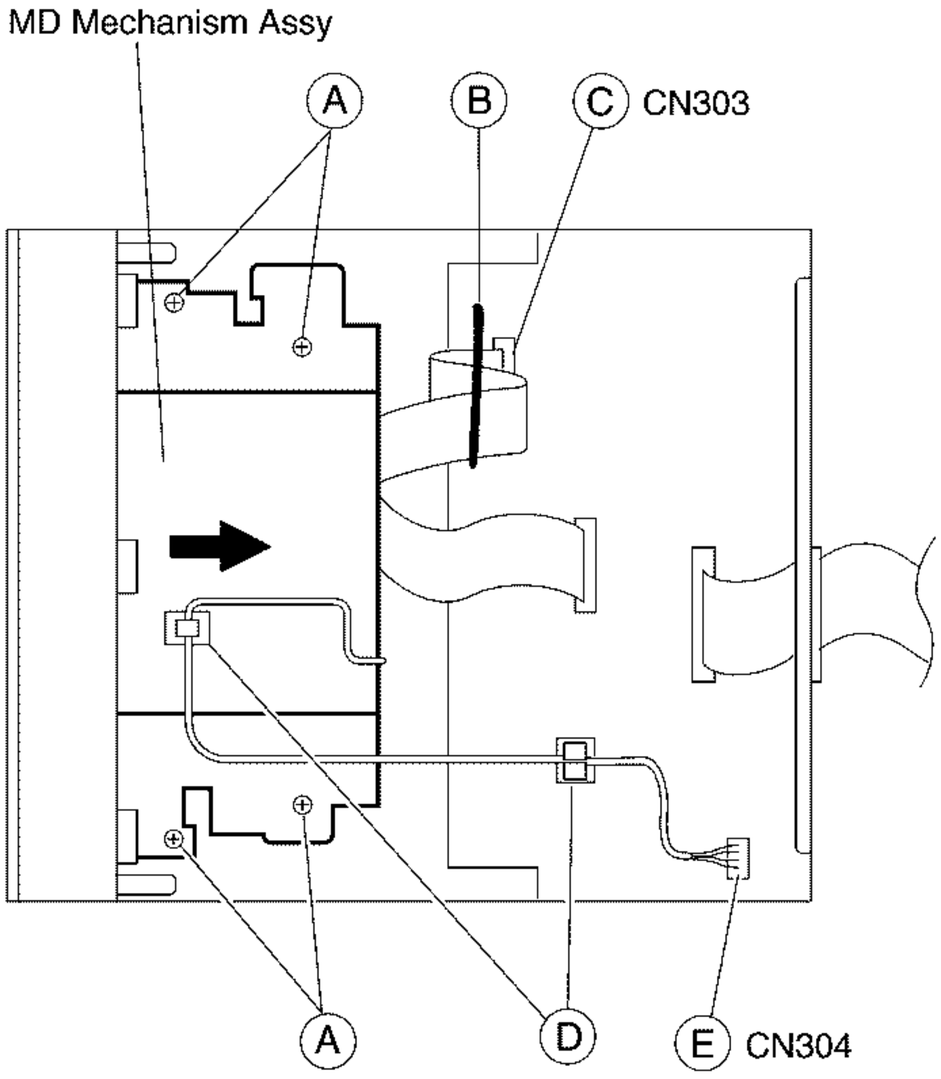
No.	Name	Level	Description
1	NC	–	Not used
2	AD	H/L	H: D0–D7 are display data. L: D0–D7 are instructions.
3	CS	H/L	Chip select signal L; Select
4	SI	H/L	Serial data input
5	SCL	H/L	Serial clockn input
6	VDD	–	Power for logic
7	Vss	–	Power for logic (GND)
8	V5	–	Power for driving crystal V5 ≧ VOUT
9	V4	–	Power for driving crystal V4 = 4/5 • V5
10	V3	–	Power for driving crystal V3 = 3/5 • V5
11	V2	–	Power for driving crystal V2 = 2/5 • V5
12	V1	–	Power for driving crystal V1 = 1/5 • V5
13	VOUT	–	Output terminal during voltage rise
14	Vss	–	Power for logic (GND)
15	VDD	–	Power for logic
16	RES	H/L	Reset terminal
17	NC	–	Not used

7.2 DIAGNOSIS

7.2.1 DISASSEMBLY

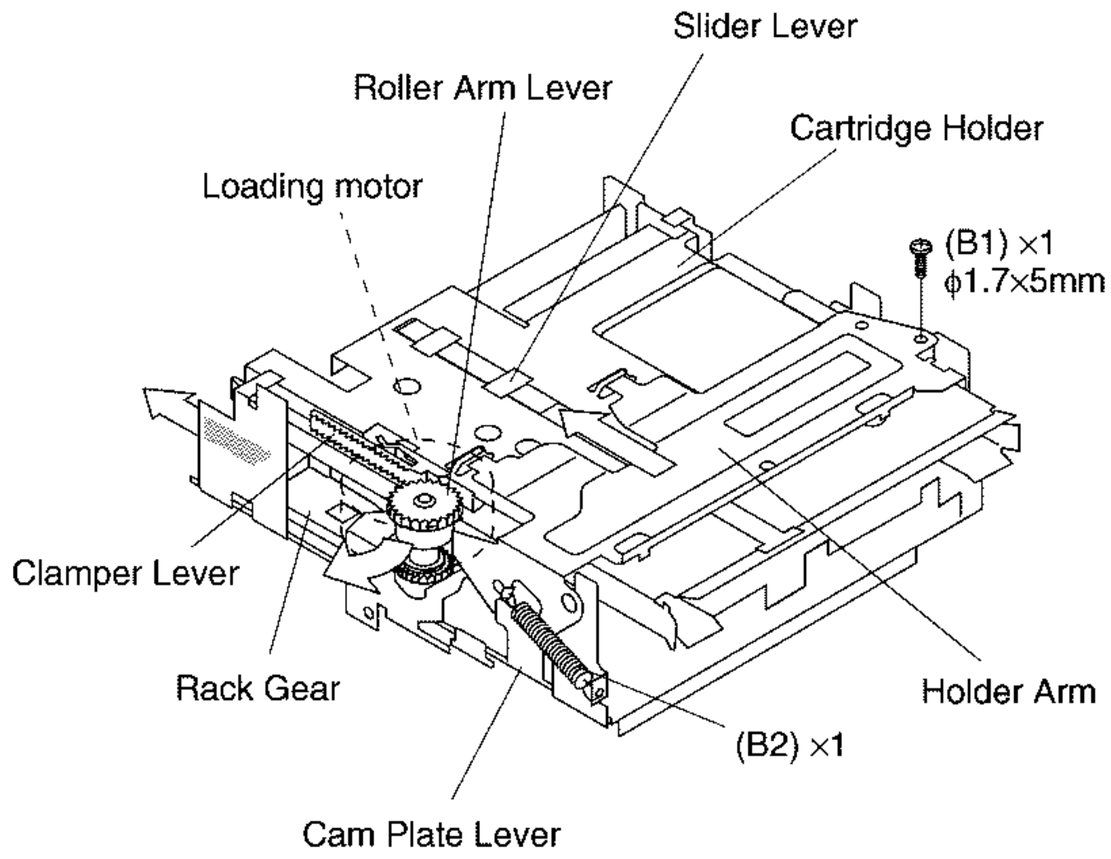
● Removing the MD Mechanism Assy

(1) Remove the Bonnet case (three screws)
(2) Remove the four screws Ⓐ.
(3) Open the cable holder Ⓑ holding the lead wire from the MD mechanism assy and pull the lead wire Ⓒ from the connector.
(4) Open the two cable clips Ⓓ holding the lead wire from the MD mechanism assy and pull the lead wire Ⓔ from the connector.
(5) Slide the MD mechanism assy to the rear and disconnect.



● Removing the Cartridge Holder

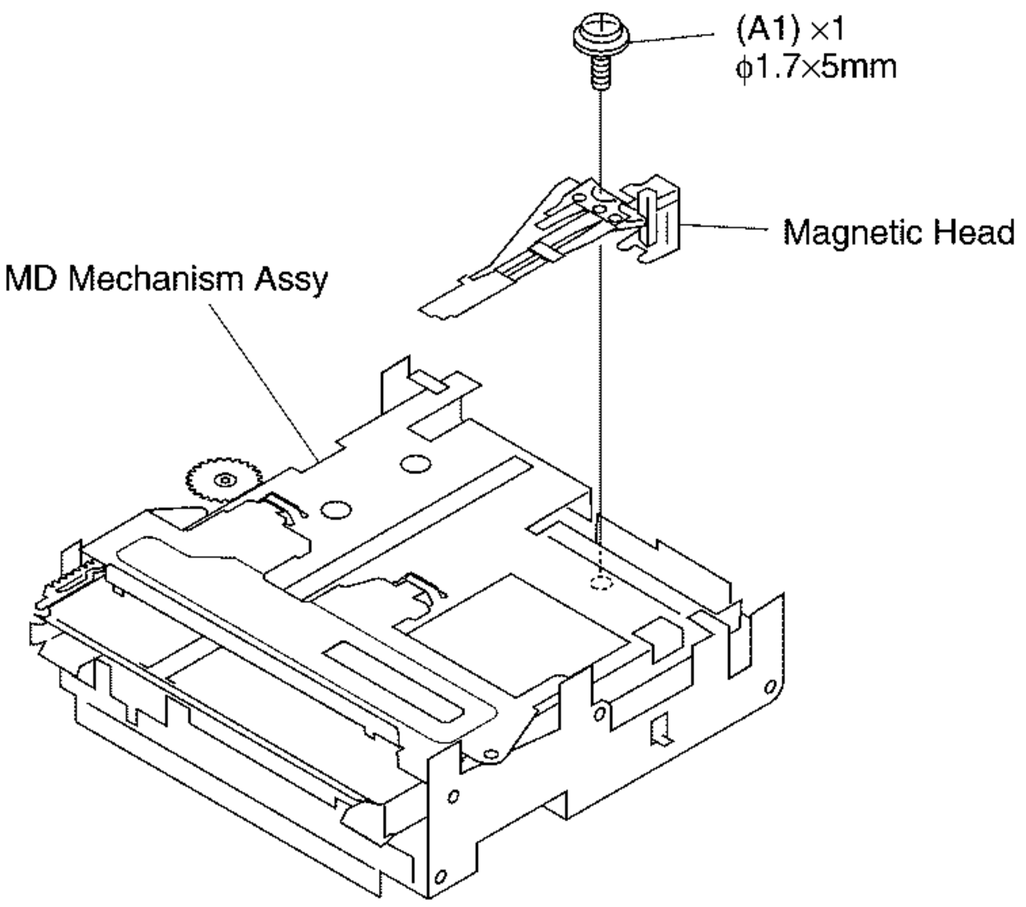
(1) Open the roller arm lever in the direction of the arrow, and lower the clamper lever until it reaches the unit rear.
(2) Apply +5V to the red wire side of the loading motor blue connector, and push the rack gear in the direction of the arrow, moving it until the cam plate lever starts to clatter.
(3) Remove the screw (B1) × 1 and spring (B2) × 1 holding the holder arm in place, and remove the cartridge holder, sliding it out to the left.



● Removing the Magnetic Head

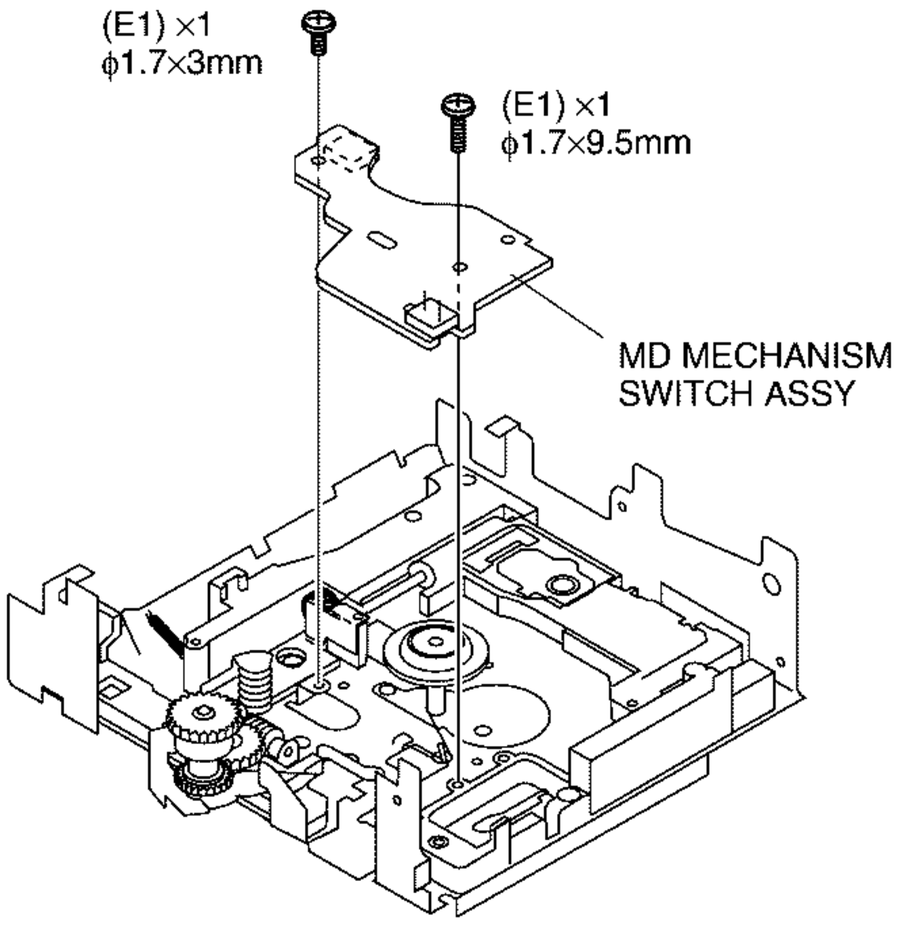
(1) Remove the Screw (A1).

CAUTION: Take adequate caution not to damage the Magnetic Head during reinstallation.



● Removing the MD MECHANISM SWITCH Assy

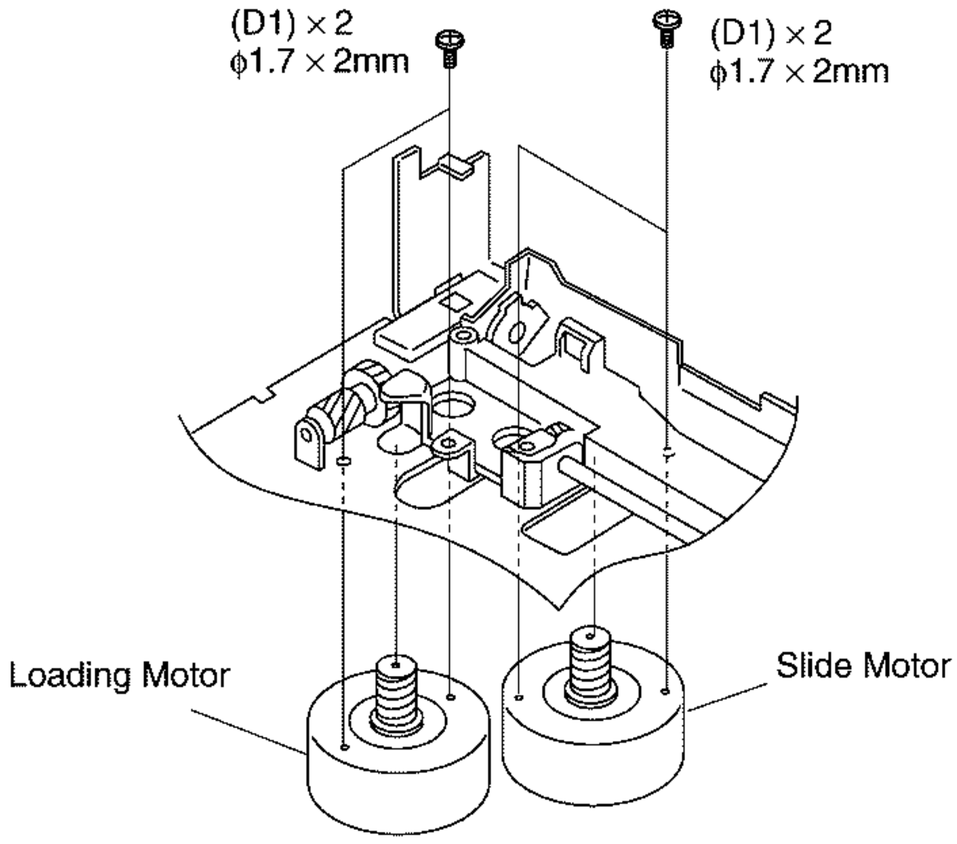
(1) Remove the two Screws (E1).
Remove the MD MECHA SW Assy.



● Removing the Slide and Loading Motors

(1) Remove the four Screws (D1) to remove the Slide and Loading Motors.

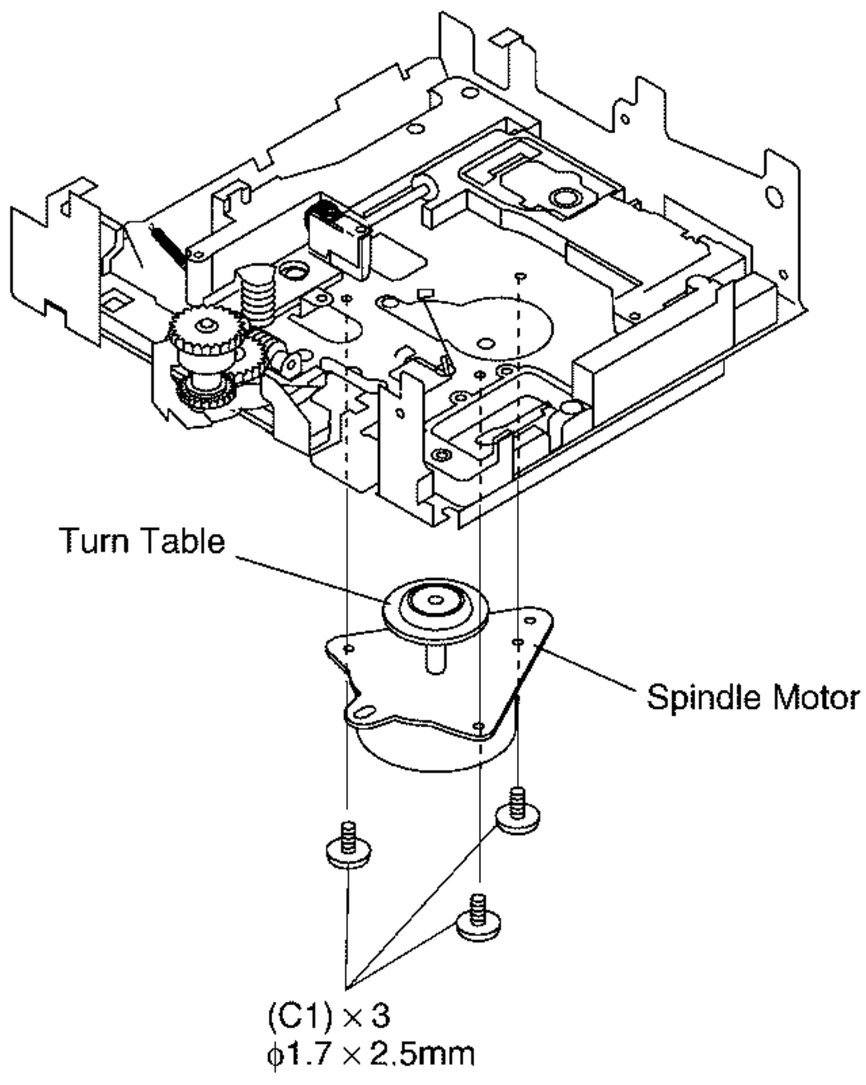
CAUTION: Be careful not to damage the Gears. (Damaged Gears may cause abnormal noise during searching.)



● Removing the Spindle Motor

(1) Remove the three Screws (C1) to remove the Spindle Motor.

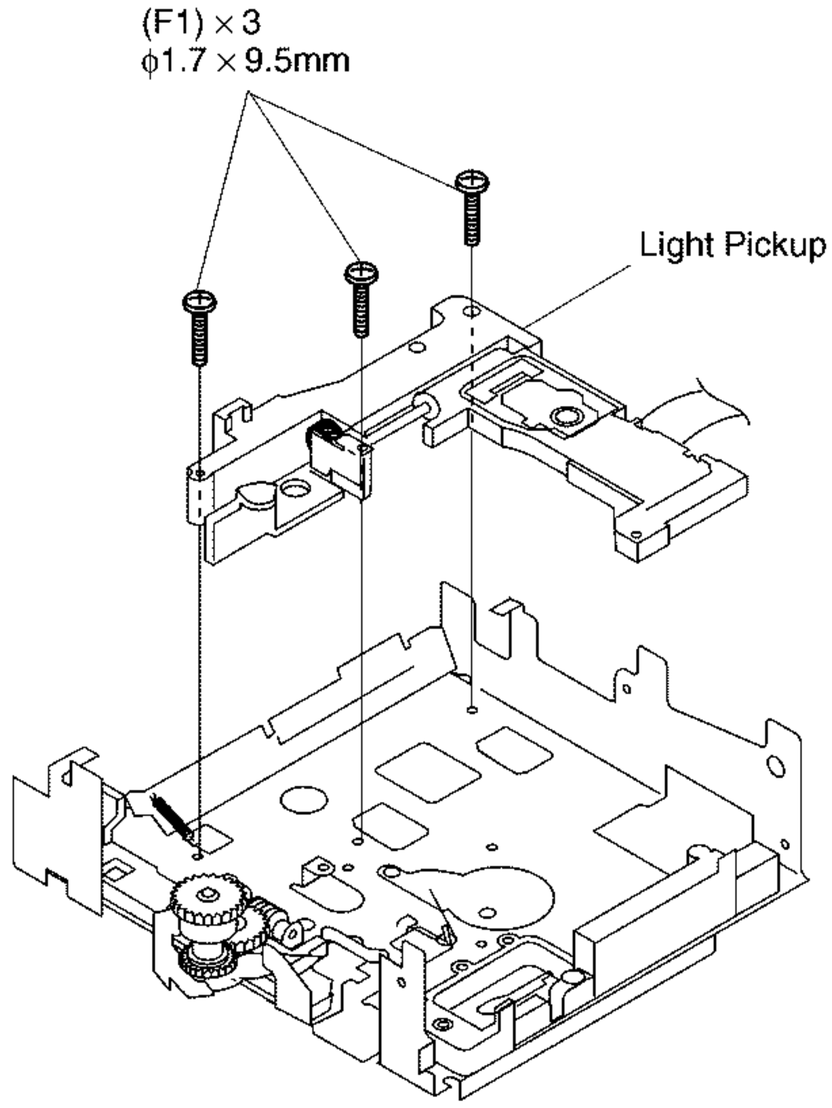
CAUTION : Be careful not to damage the Gears. (Damaged Gears may cause abnormal noise during searching.)



● Removing the Light Pickup

(1) Remove the three Screws (F1).

CAUTION: Be careful not to damage the Gears. (Damaged Gears may cause abnormal noise during searching.)



7.2.2 DETAILS OF ERROR DISPLAY

Error Display	Details of Error	Measure
Can't REC	● DEFECT occurred 10 times continuously during REC-PLAY. ● Recordable cluster became 0 since DEFECT occurred during REC-PLAY. ● Address is unreadable. REC state can not be set for 20 seconds even after try again.	● Check if there are scratches, dusts, fingerprints, or black spots on disc. Check if disc fluctuates eccentrically or moves up and down largely.
Can't COPY	● Determined as follows according to the channel status of the signals input from D-IN during REC-PAUSE or REC-PLAY. 1. Other than audio 2. Other than consumer use 3. Copy NG due to inversion of COPY bit of CD	● Check if CD is copy-proof. (Example: CD-R, etc.)
D-IN UNLOCK	● The following occurred for digital signal input from D-IN during REC-PAUSE, REC-PLAY, or CD FUNC playback 1. Digital IN PLL unlocked. 2. Locked at other than FS = 32, 44.1 and 48 kHz.	● Check if D-IN signal line is normal.
TOC FULL	● No area for registering music number and character information during REC-PLAY (music name, disc number, etc.)	● Replace with recording/playback disc with space for registering UTOC.
UTOC R ERROR	● FTNO > LTNO. ● FTNO ≠ 0 or 1. ● UTOC recorded on DISC could not be read.	● Replace with other discs to check if UTOC data is normal.
UTOC ERR A	● Start address > End address.	● Replace with other discs to check if UTOC data is normal.
UTOC ERR L	● Any one data of UTOC 0 to 4 has looped.	● Replace with other discs to check if UTOC data is normal.
NOT AUDIO	● Data not for audio is recorded for TNO track mode currently selected.	● Select other TNO or replace with other discs.
UNKNOWN DISC	● Data called MINI of system ID written in ASCII codes in TOC is incorrect. ● Disc type written in TOC is not pre-mastered MD, recording MD, or hybrid MD.	● Disc is outside specifications. Replace with different disc and check.
DISC FULL	● No recordable space when attempted to set REC-PAUSE.	● Replace with different disc with recording space.
PREMASTERED	● Disc only for playback was loaded when attempted to set REC-PAUSE or edit.	● Disc is for playback only. Replace with disc for recording.
PROTECTED	● Attempted to record or edit even through REC-proof knob of disc for recording was in the REC-proof state. ● Attempted to edit track with write-protect according to information on UTOC.	● Track attempted to be edited is write-protected. Try again with different track. ● Restore the REC-proof knob and try again.
Can' t EDIT	● Editing conditions were not satisfied for each editing function.	● Operating method is wrong. Try again using correct method.
TEMP OVER	● Temperature inside unit (MD unit) was too high due to fault.	● Check according to TROUBLESHOOTING.
DISC ERR	● Data read was incorrect or could not be read properly. ● Error occurred during music data recording and recording could not be performed correctly.	● Faulty TOC or UTOC data or scratch on disc. Replaced with other discs.

7.2.2 Details of Error Display

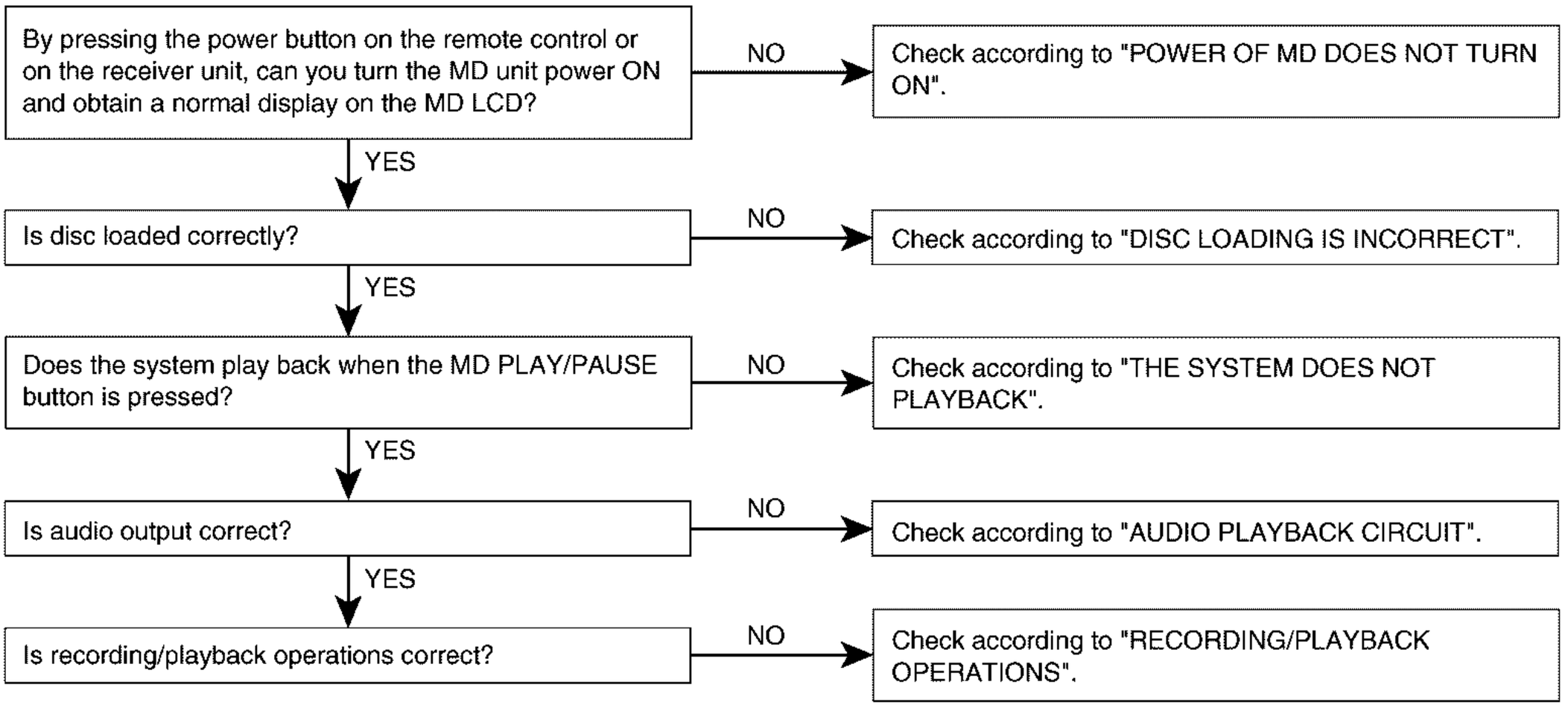
Error Display	Details of Error	Measure
UNKNOWN DISC	● TOC read was incorrect or could not be read properly.	● The TOC data recorded on the disc do not comply with MD Standards, so try using another disc. ● The disc may be scratched or damaged, so try using another disc.
UTOC W ERR	● Fault occurred during rewriting of UTOC rewriting, and rewriting could not be performed correctly.	● Scratch on disc. Replaced with other discs.
UNKNOWN DISC	● Inserted a disc but could not bring in FOCUS.	● Check if there are scratches, dusts, fingerprints, or black spots on disc. Check if disc fluctuates eccentrically or moves up and down largely.
BLANK MD	● After reading UTOC, total number of TNO and NAME characters was 0.	● Record and check if disc is recordable.
DEFECT	● Focus execution error, etc. occurred due to shock during REC-PLAY.	● Check if there are scratches, dusts, fingerprints, or black spots on disc. Check if disc fluctuates eccentrically or moves up and down largely.
UTOC W ERROR	● UTOC read was correct but could not be rewrite it.	● Check to see if the recording head contact is correct or if there are any disconnections between the board and the recording head.
EEPROM ERROR	● The EEPROM data are incorrect.	● Try doing a RESET operation again. If the problem still persists, replace the EEPROM.
MECHA ERROR	● Never completes EJECT. ● Never moves HEAD UP. ● Never moves HEAD DOWN. ● The set microcomputer and MD mechanism microcomputer are not communicating properly.	

7.2.3 TROUBLESHOOTING

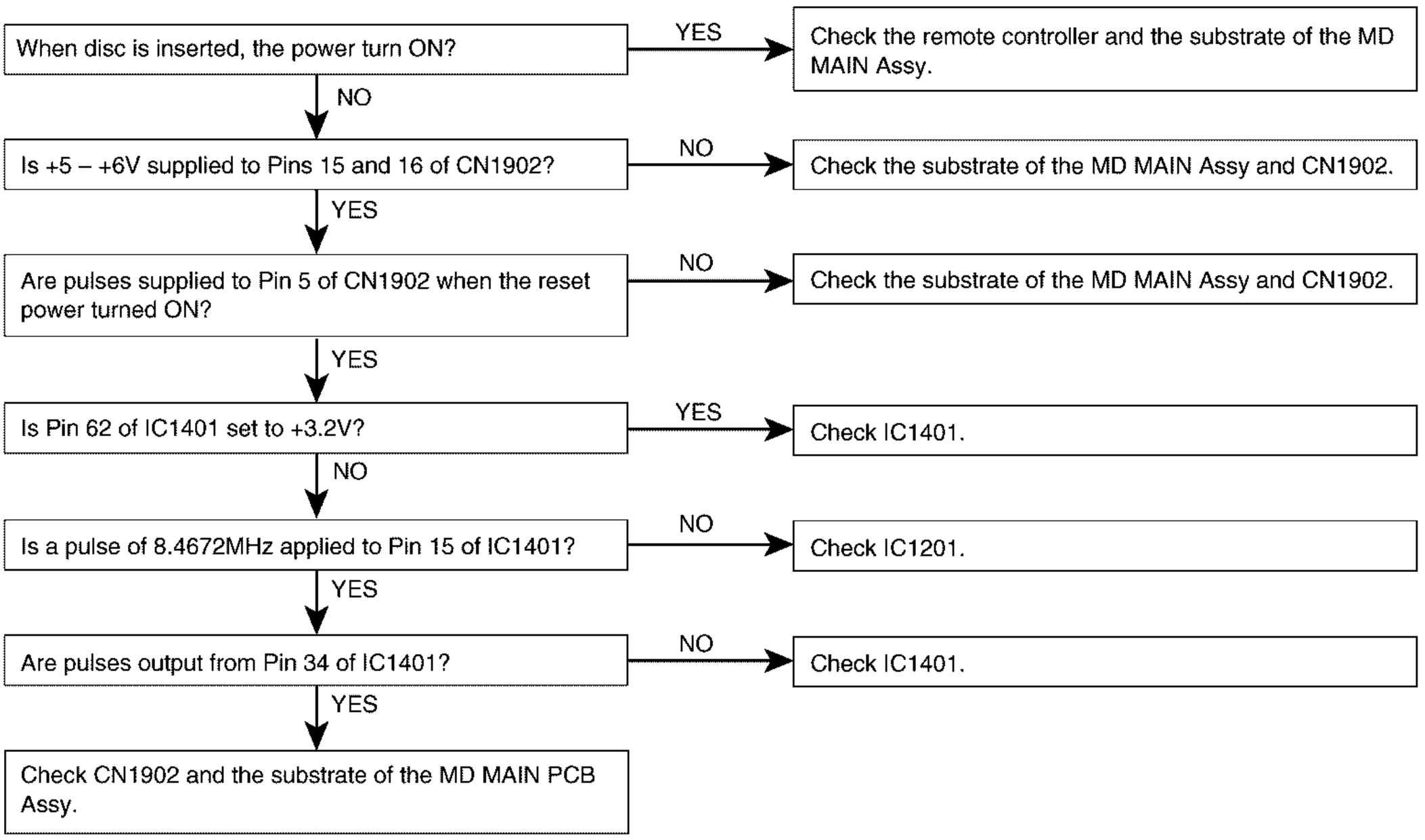
● MD does not Operate

MD may not operate if the objective lens of the Light Pickup is soiled. Clean the objective lens, then check playback operation. If the symptom still persists, check the points according to the flowchart below.
If dust or foreign matter has deposited on the Pickup Lens, the system may skip tracks or may not display TOC (content of song titles). Confirm that the lens is clean before making adjustment. If the lens is soiled, perform as follows:

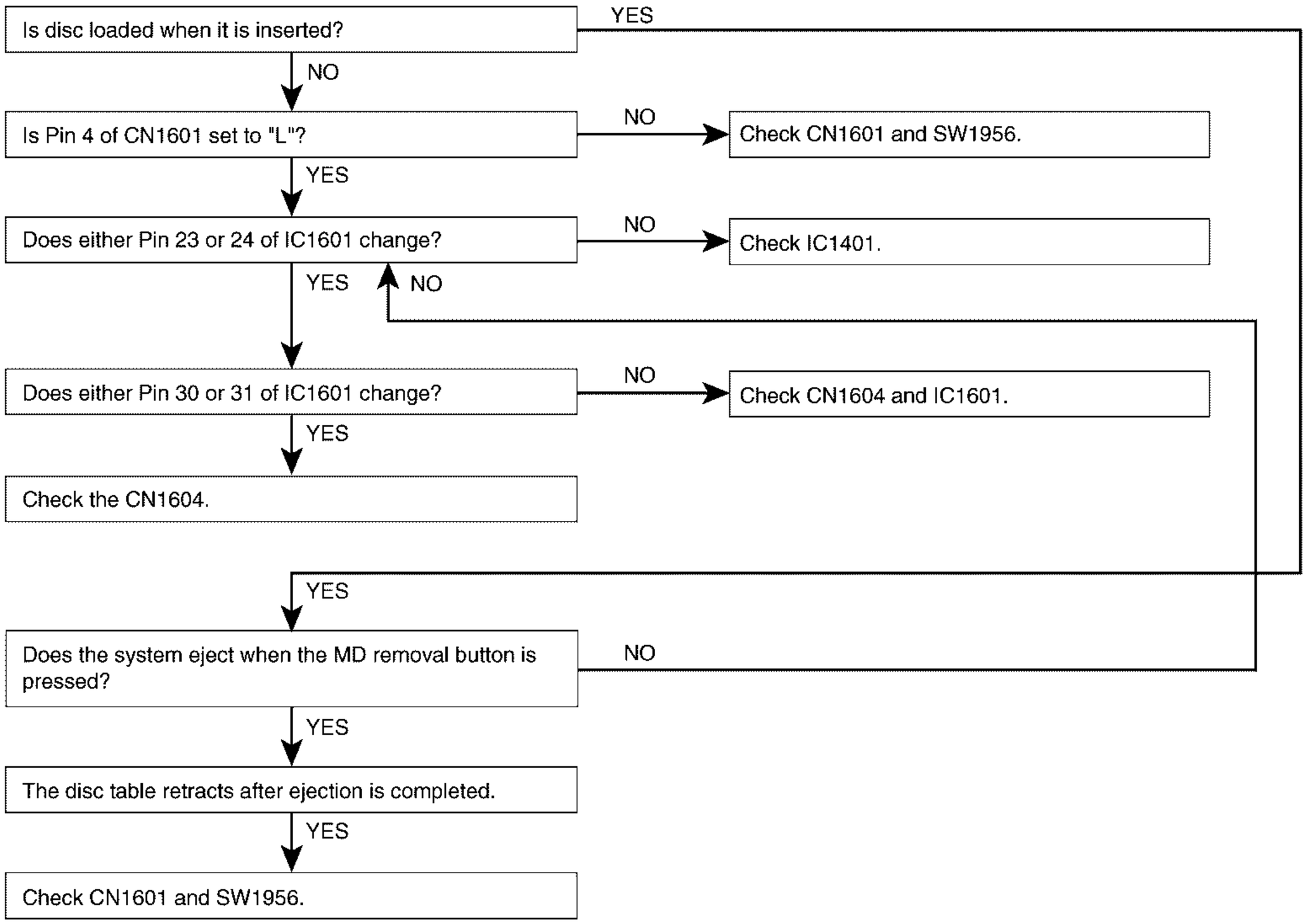
Switch the power of the unit OFF. Apply a small amount of isopropyl alcohol to the lens cleaning paper and clean the lens carefully. Be careful not to damage the lens. Do not touch the lens directly with your hand.


By pressing the power button on the remote control or on the receiver unit, can you turn the MD unit power ON and obtain a normal display on the MD LCD?
NO
Check according to "POWER OF MD DOES NOT TURN ON".
YES
Is disc loaded correctly?
NO
Check according to "DISC LOADING IS INCORRECT".
YES
Does the system play back when the MD PLAY/PAUSE button is pressed?
NO
Check according to "THE SYSTEM DOES NOT PLAYBACK".
YES
Is audio output correct?
NO
Check according to "AUDIO PLAYBACK CIRCUIT".
YES
Is recording/playback operations correct?
NO
Check according to "RECORDING/PLAYBACK OPERATIONS".

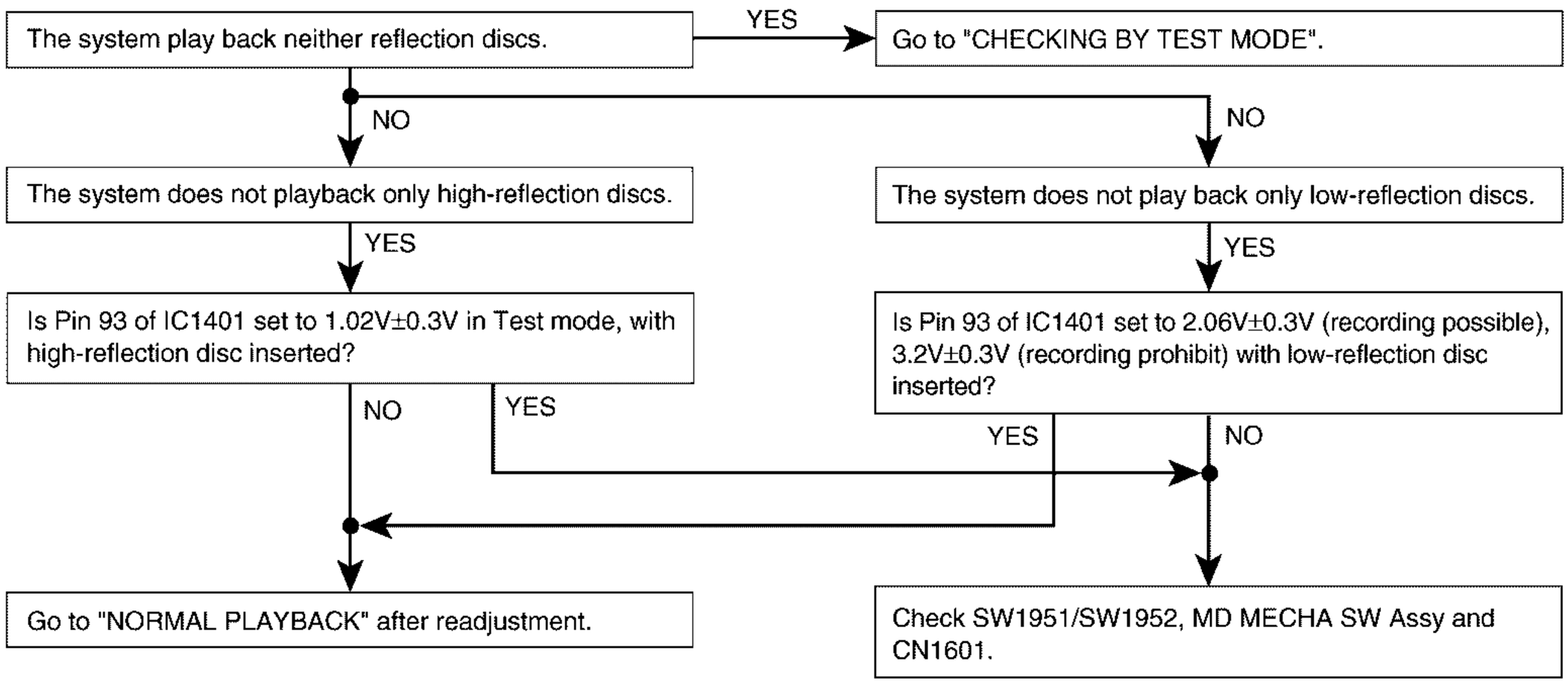
● Power of MD does not turn on


When disc is inserted, the power turn ON?
YES
Check the remote controller and the substrate of the MD MAIN Assy.
NO
Is +5 – +6V supplied to Pins 15 and 16 of CN1902?
NO
Check the substrate of the MD MAIN Assy and CN1902.
YES
Are pulses supplied to Pin 5 of CN1902 when the reset power turned ON?
NO
Check the substrate of the MD MAIN Assy and CN1902.
YES
Is Pin 62 of IC1401 set to +3.2V?
YES
Check IC1401.
NO
Is a pulse of 8.4672MHz applied to Pin 15 of IC1401?
NO
Check IC1201.
YES
Are pulses output from Pin 34 of IC1401?
NO
Check IC1401.
YES
Check CN1902 and the substrate of the MD MAIN PCB Assy.

● Disc loading is incorrect

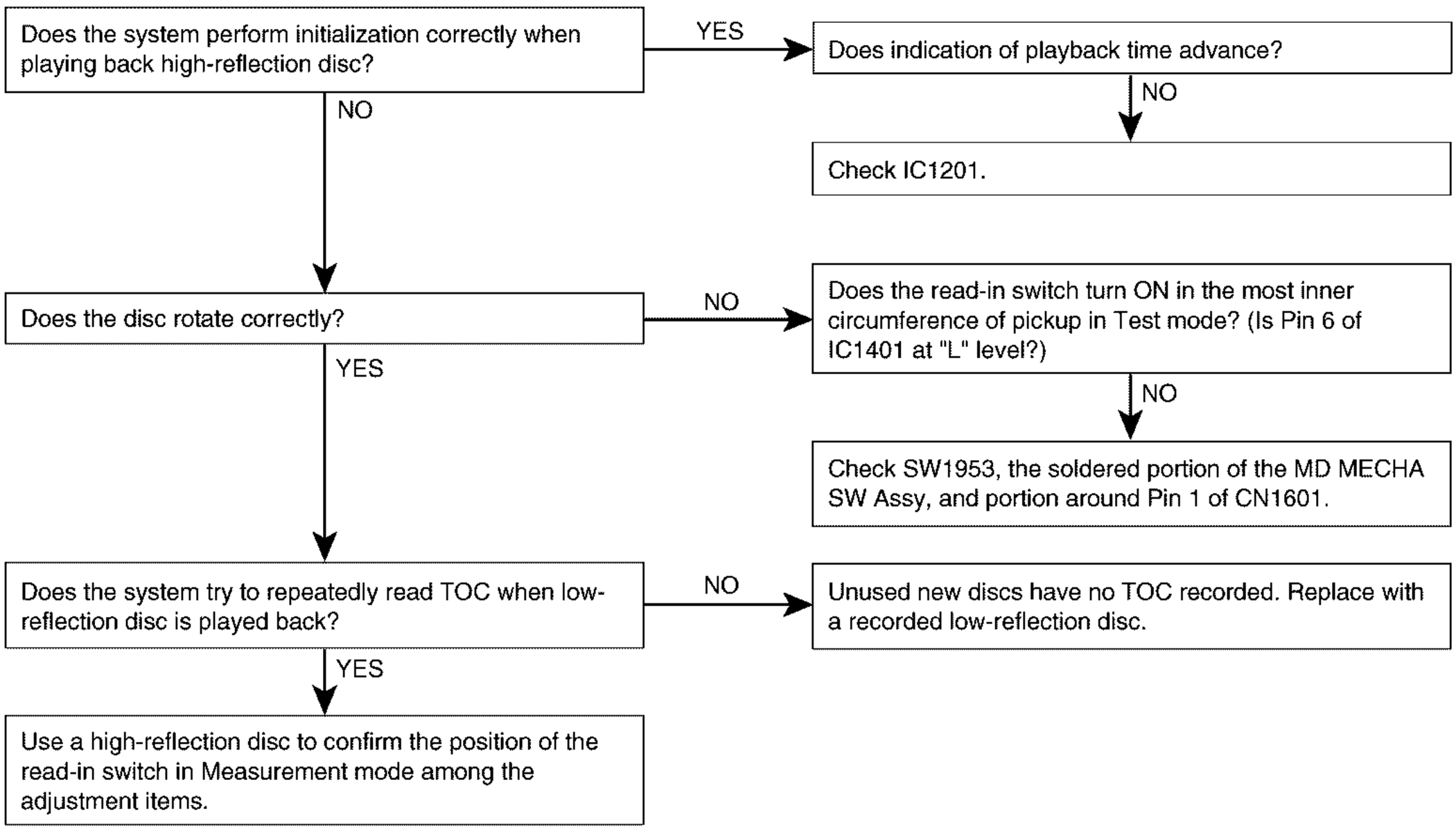


● The system does not playback


The system play back neither reflection discs.
YES
Go to "CHECKING BY TEST MODE".
NO
NO
The system does not playback only high-reflection discs.
The system does not play back only low-reflection discs.
YES
YES
Is Pin 93 of IC1401 set to 1.02V±0.3V in Test mode, with high-reflection disc inserted?
Is Pin 93 of IC1401 set to 2.06V±0.3V (recording possible), 3.2V±0.3V (recording prohibit) with low-reflection disc inserted?
NO
YES
YES
NO
Go to "NORMAL PLAYBACK" after readjustment.
Check SW1951/SW1952, MD MECHA SW Assy and CN1601.

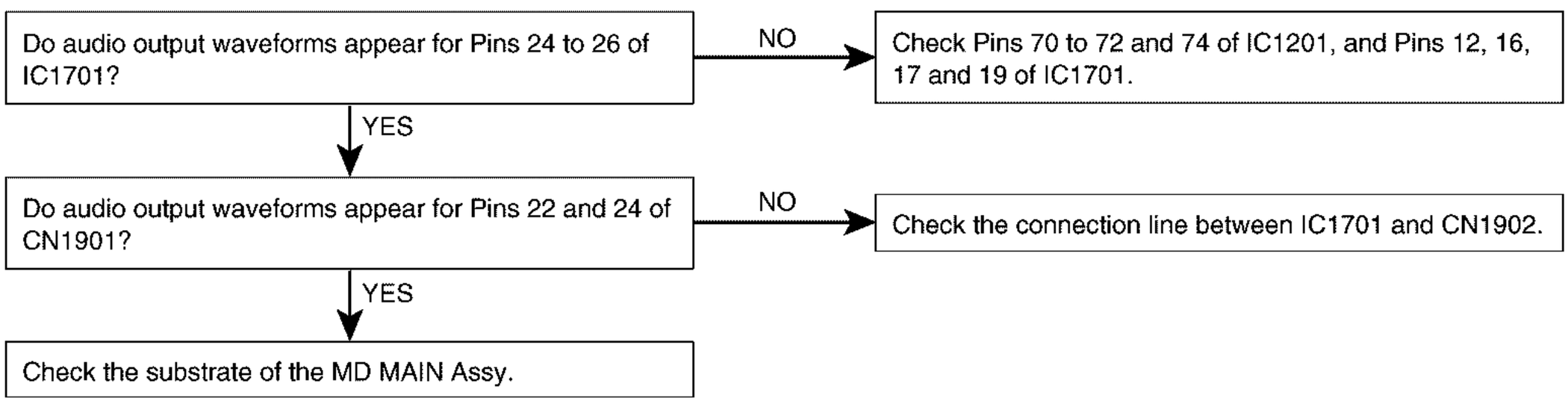
● Normal playback

It is confirmed that EEPROM value is correct in Test mode:


Does the system perform initialization correctly when playing back high-reflection disc?
YES
Does indication of playback time advance?
NO
Check IC1201.
NO
Does the disc rotate correctly?
NO
Does the read-in switch turn ON in the most inner circumference of pickup in Test mode? (Is Pin 6 of IC1401 at "L" level?)
YES
NO
Check SW1953, the soldered portion of the MD MECHA SW Assy, and portion around Pin 1 of CN1601.
Does the system try to repeatedly read TOC when low-reflection disc is played back?
NO
Unused new discs have no TOC recorded. Replace with a recorded low-reflection disc.
YES
Use a high-reflection disc to confirm the position of the read-in switch in Measurement mode among the adjustment items.

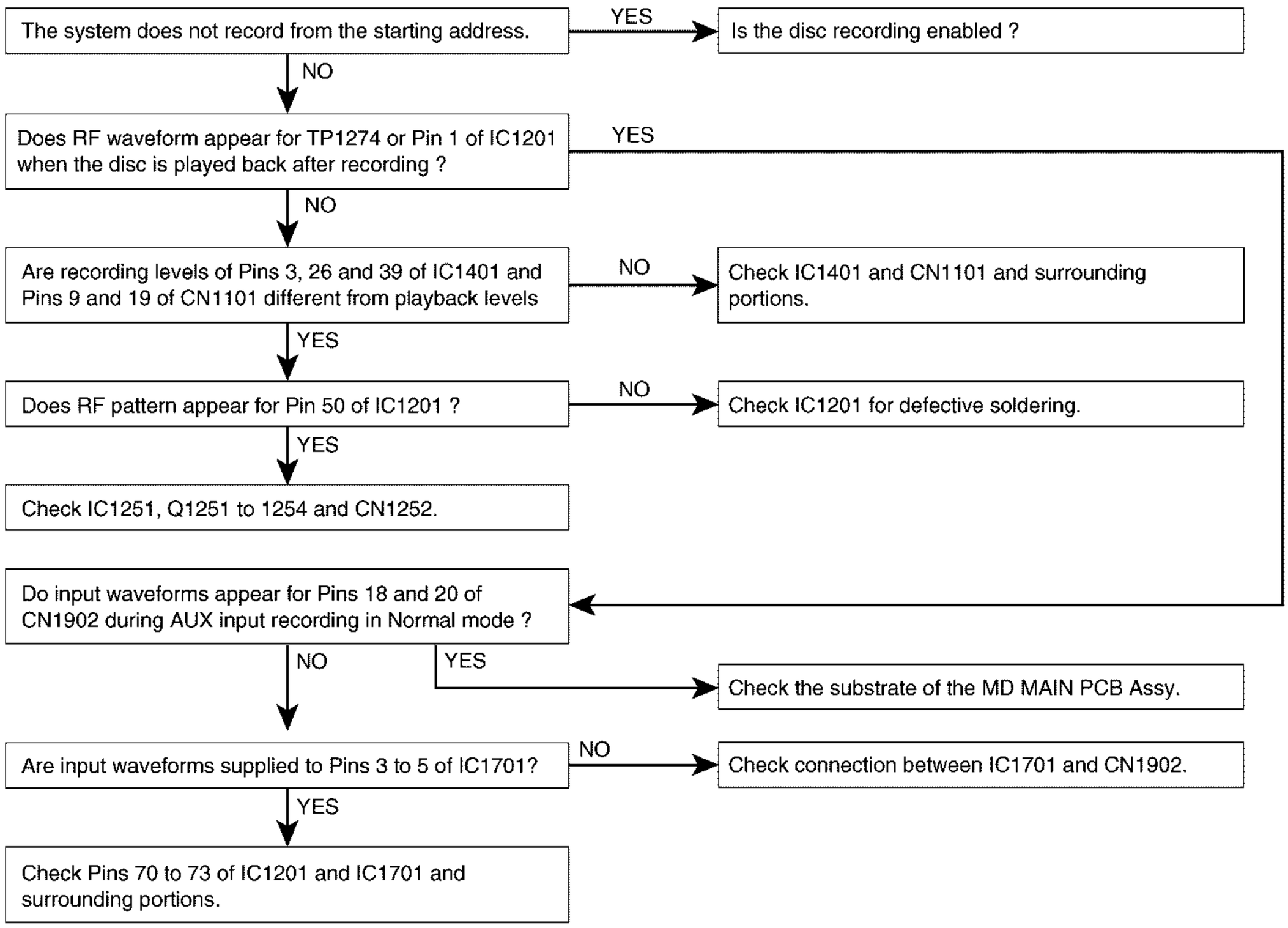
● Audio playback circuit

No sound is output even though indication of playback time advances during playback in Normal mode:

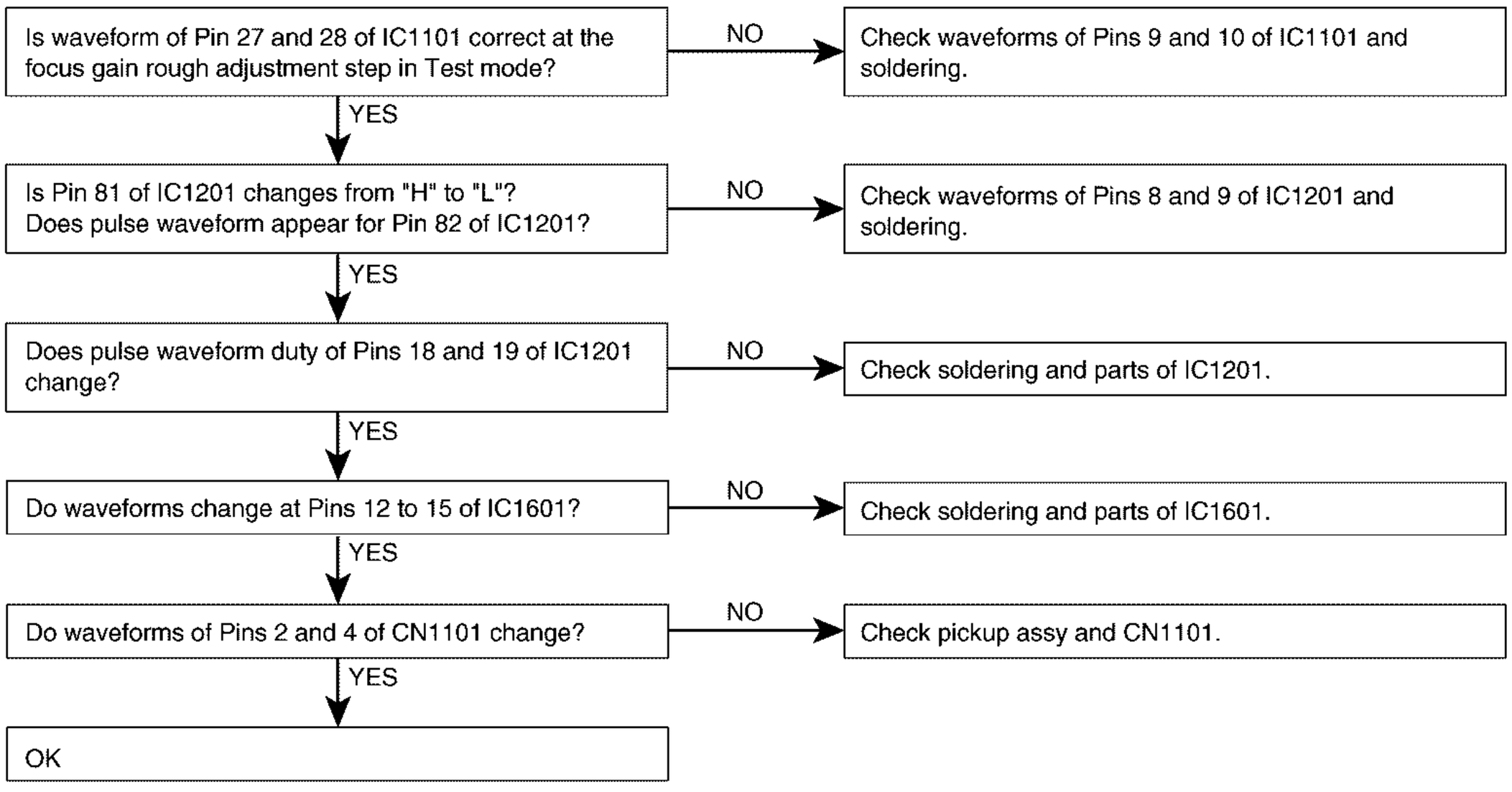

Do audio output waveforms appear for Pins 24 to 26 of IC1701?
NO
Check Pins 70 to 72 and 74 of IC1201, and Pins 12, 16, 17 and 19 of IC1701.
YES
Do audio output waveforms appear for Pins 22 and 24 of CN1901?
NO
Check the connection line between IC1701 and CN1902.
YES
Check the substrate of the MD MAIN Assy.

● Recording/playback operations

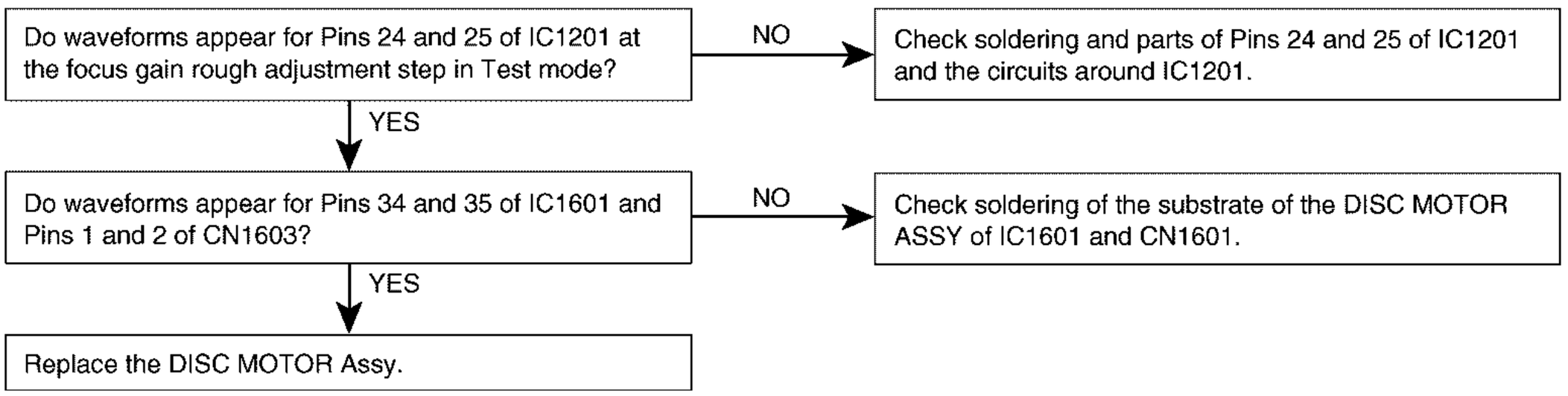
Insert a low-reflection disc to confirm audio output during playback in Normal mode, then set the system to Recording/Playback Test mode.


The system does not record from the starting address.
YES
Is the disc recording enabled ?
NO
Does RF waveform appear for TP1274 or Pin 1 of IC1201 when the disc is played back after recording ?
YES
NO
Are recording levels of Pins 3, 26 and 39 of IC1401 and Pins 9 and 19 of CN1101 different from playback levels
NO
Check IC1401 and CN1101 and surrounding portions.
YES
Does RF pattern appear for Pin 50 of IC1201 ?
NO
Check IC1201 for defective soldering.
YES
Check IC1251, Q1251 to 1254 and CN1252.
Do input waveforms appear for Pins 18 and 20 of CN1902 during AUX input recording in Normal mode ?
NO
YES
Check the substrate of the MD MAIN PCB Assy.
Are input waveforms supplied to Pins 3 to 5 of IC1701?
NO
Check connection between IC1701 and CN1902.
YES
Check Pins 70 to 73 of IC1201 and IC1701 and surrounding portions.

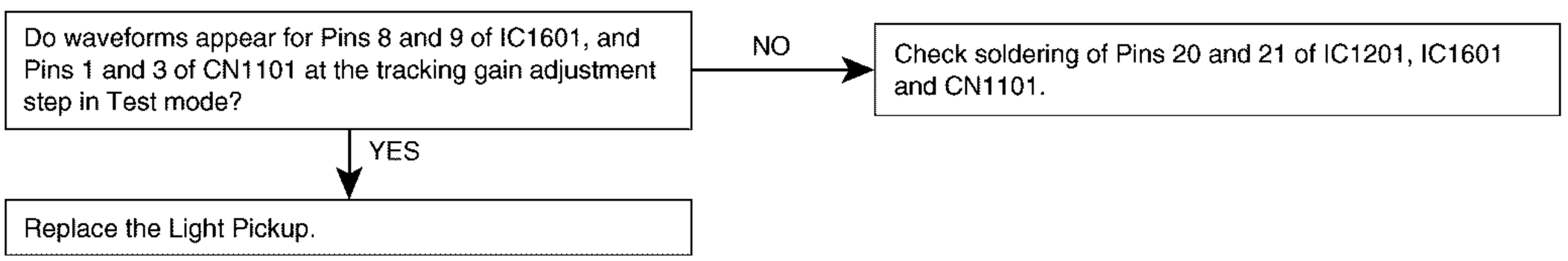
● The focus servo does not function


Is waveform of Pin 27 and 28 of IC1101 correct at the focus gain rough adjustment step in Test mode?
NO
Check waveforms of Pins 9 and 10 of IC1101 and soldering.
YES
Is Pin 81 of IC1201 changes from "H" to "L"?
Does pulse waveform appear for Pin 82 of IC1201?
NO
Check waveforms of Pins 8 and 9 of IC1201 and soldering.
YES
Does pulse waveform duty of Pins 18 and 19 of IC1201 change?
NO
Check soldering and parts of IC1201.
YES
Do waveforms change at Pins 12 to 15 of IC1601?
NO
Check soldering and parts of IC1601.
YES
Do waveforms of Pins 2 and 4 of CN1101 change?
NO
Check pickup assy and CN1101.
YES
OK

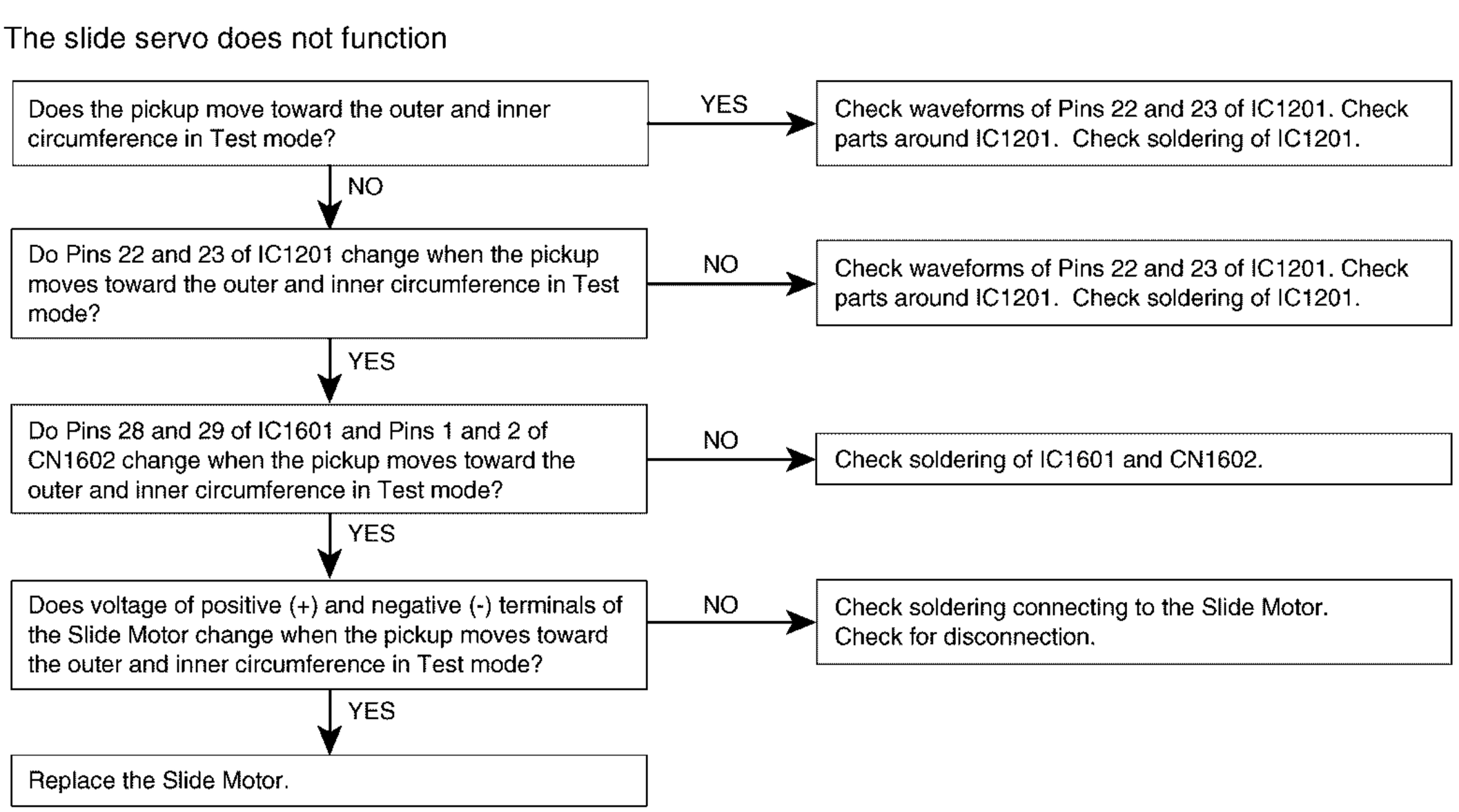
● The disc motor does not rotate


Do waveforms appear for Pins 24 and 25 of IC1201 at the focus gain rough adjustment step in Test mode?
NO
Check soldering and parts of Pins 24 and 25 of IC1201 and the circuits around IC1201.
YES
Do waveforms appear for Pins 34 and 35 of IC1601 and Pins 1 and 2 of CN1603?
NO
Check soldering of the substrate of the DISC MOTOR ASSY of IC1601 and CN1601.
YES
Replace the DISC MOTOR Assy.

● The tracking servo does not function

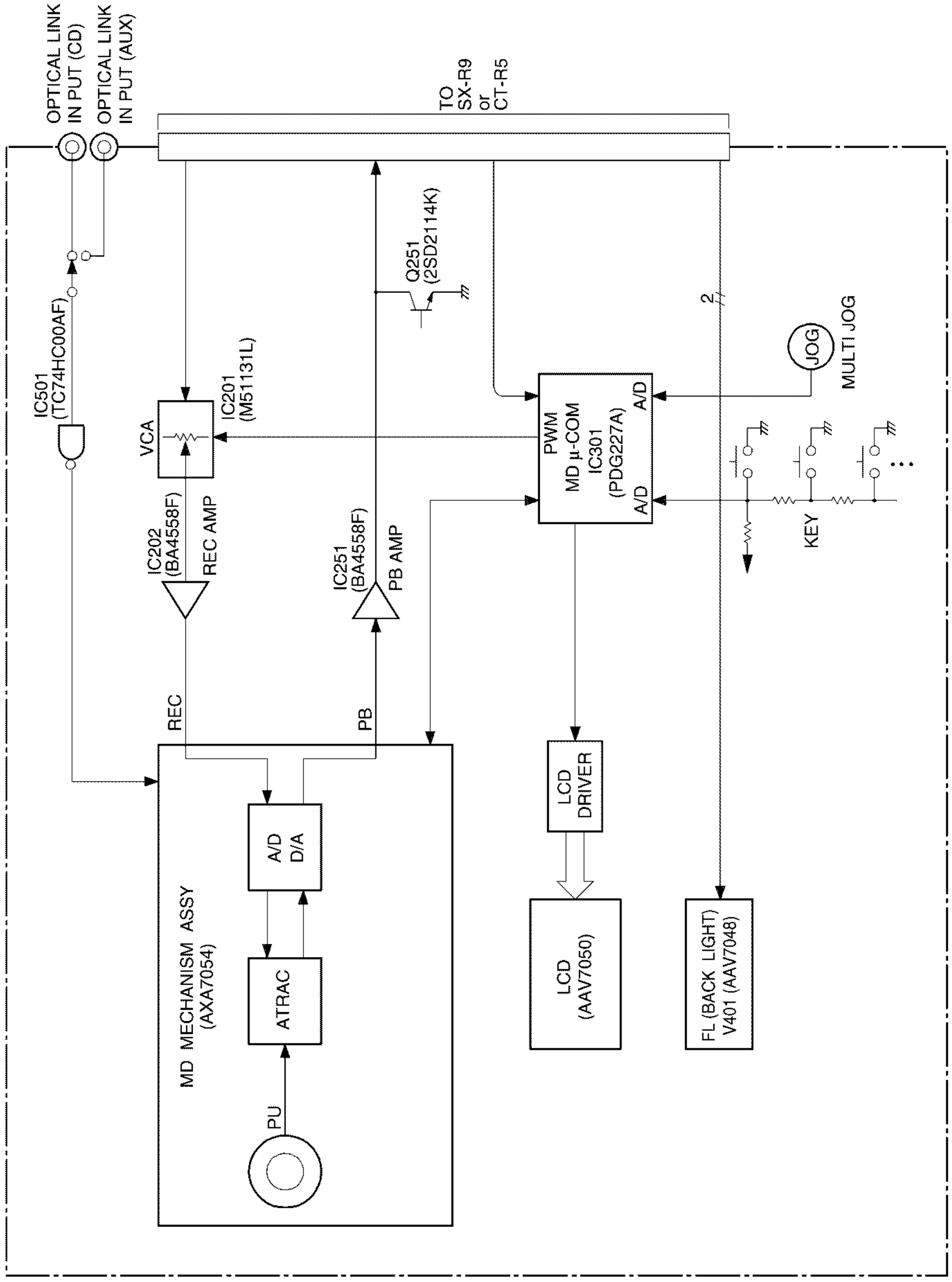

Do waveforms appear for Pins 8 and 9 of IC1601, and Pins 1 and 3 of CN1101 at the tracking gain adjustment step in Test mode?
NO
Check soldering of Pins 20 and 21 of IC1201, IC1601 and CN1101.
YES
Replace the Light Pickup.

● The slide servo does not function

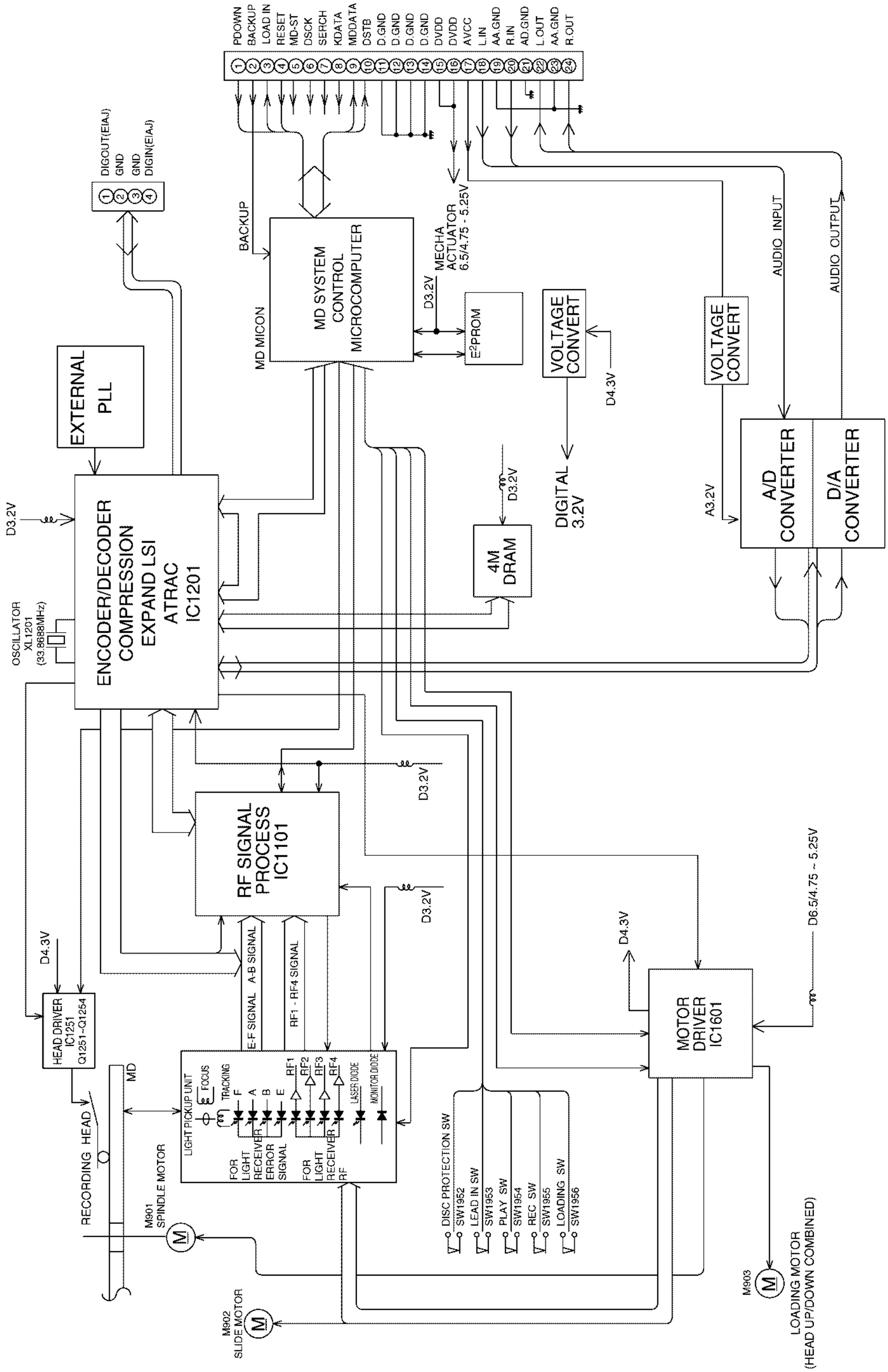

Does the pickup move toward the outer and inner circumference in Test mode?
YES
Check waveforms of Pins 22 and 23 of IC1201. Check parts around IC1201. Check soldering of IC1201.
NO
Do Pins 22 and 23 of IC1201 change when the pickup moves toward the outer and inner circumference in Test mode?
NO
Check waveforms of Pins 22 and 23 of IC1201. Check parts around IC1201. Check soldering of IC1201.
YES
Do Pins 28 and 29 of IC1601 and Pins 1 and 2 of CN1602 change when the pickup moves toward the outer and inner circumference in Test mode?
NO
Check soldering of IC1601 and CN1602.
YES
Does voltage of positive (+) and negative (-) terminals of the Slide Motor change when the pickup moves toward the outer and inner circumference in Test mode?
NO
Check soldering connecting to the Slide Motor. Check for disconnection.
YES
Replace the Slide Motor.

7.3 BLOCK DIAGRAM

■ MINI DISC RECORDER (MJ-R5)



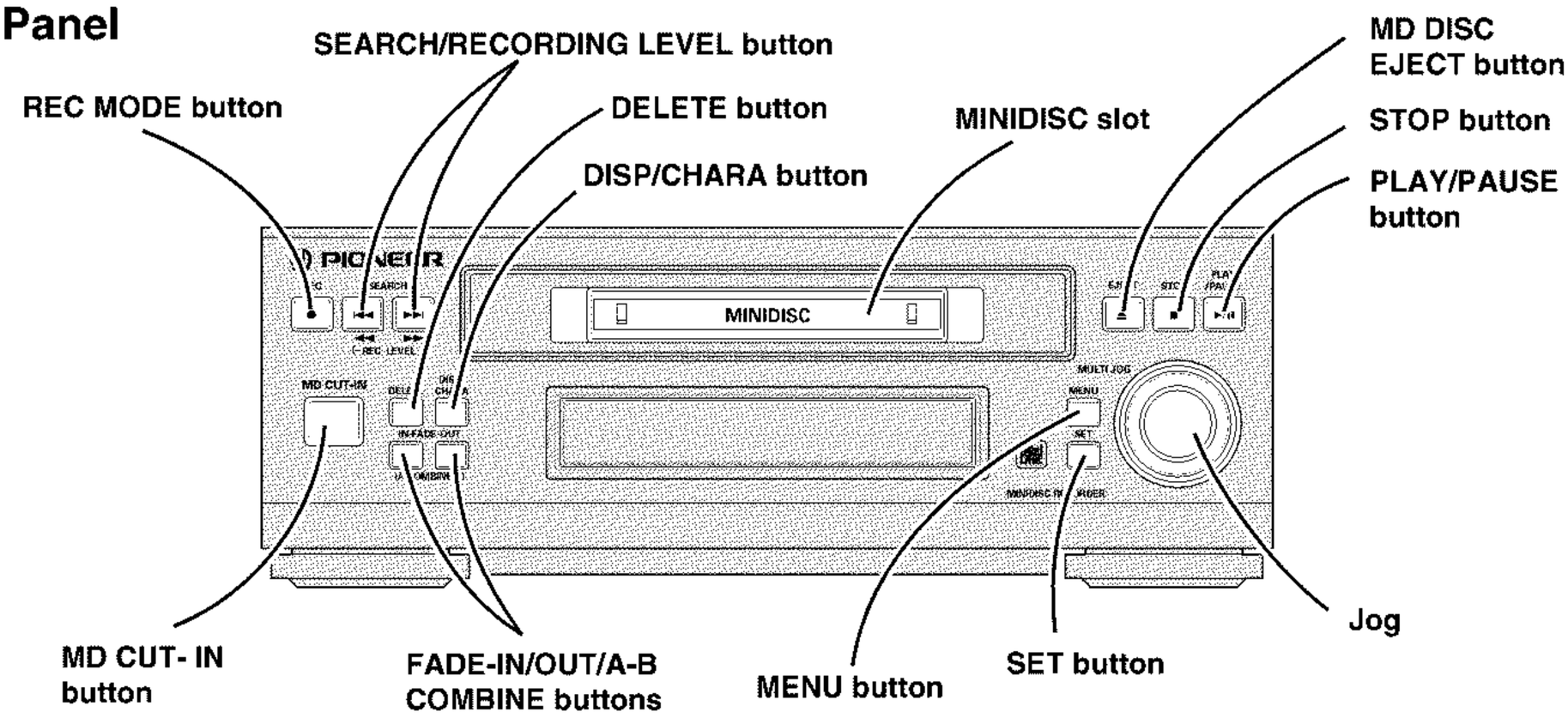
■ MD MECHANISM ASSY



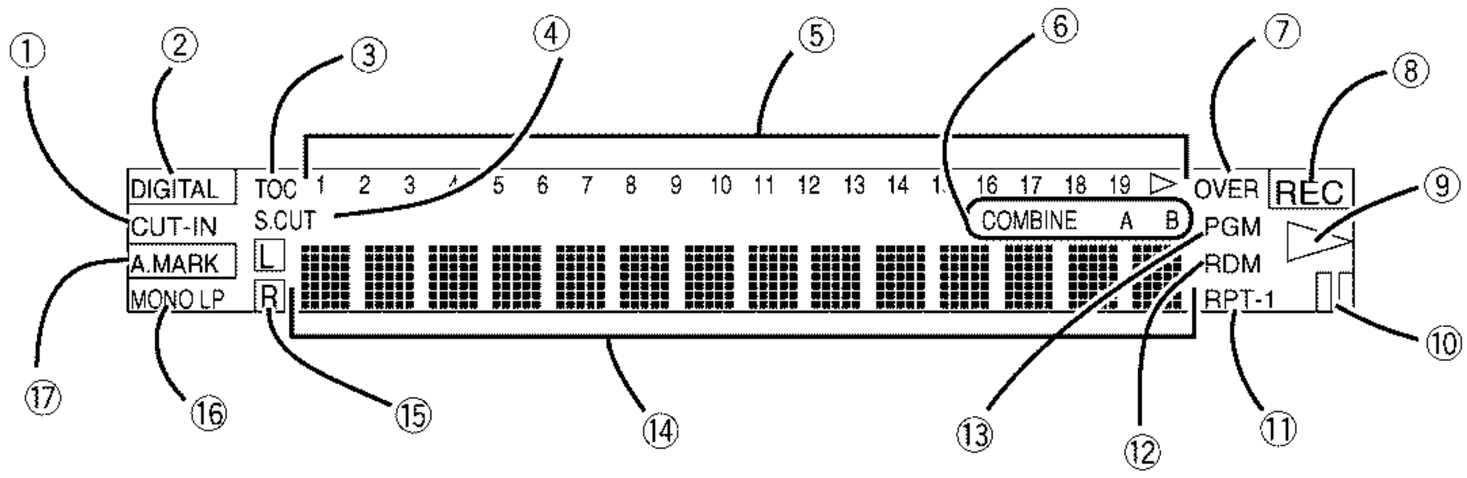
8. PANEL FACILITIES AND SPECIFICATIONS

■ PANEL FACILITIES

Front Panel



Display



① Lights during cut-in recording.
② Lights when digital recording is specified.
③ TOC indicator.
④ Lights during synchro recording.
⑤ Music calendar.
⑥ Lights during A-B combine editing.
⑦ Lights when recording level is too high.
⑧ Lights during recording.
⑨ Lights during play and recording.
⑩ Lights during pause.
⑪ Lights during repeat play.
During repeat play of all tracks: RPT.
During repeat play of 1 track: RPT-1.
⑫ Lights during random play.
⑬ Lights during programing and program play.
⑭ Alphanumeric display.
⑮ Left/right channel display (goes out during monaural play).
⑯ Lights when monaural extended recording is specified.
⑰ Lights when the auto mark is specified.

■ SPECIFICATIONS

Recording Method ..... Magnetic field modulation overwriting type
Playback Method ..... Non-contact optical type
Sampling Frequency 44.1kHz
External dimensions ..... 210 (W) x 75 (H) x 279.5 (D) mm
Weight ..... 2.0 kg

Accessories
Operating Instructions 1
Optical fiber cable 1
Warranty Card 1

NOTE:
Specifications and design subject to possible modification without notice, due to improvement.